

*Edited by*  
**The  
DENTAL  
DIGEST**

May  
1933



This map of Switzerland represents pictorially the typical sources of nutrition in some of the districts studied by Doctor Price: (1) Loetschental; (2) Grachen; (3) Vispertalmen; (4) Ayer; (5) St. Moritz; (6) Herisau

# X-RAY QUESTIONS

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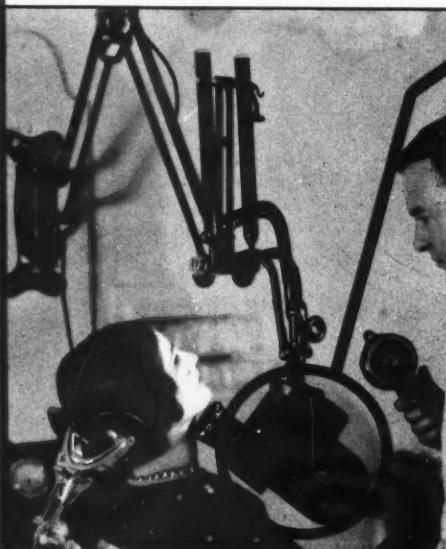
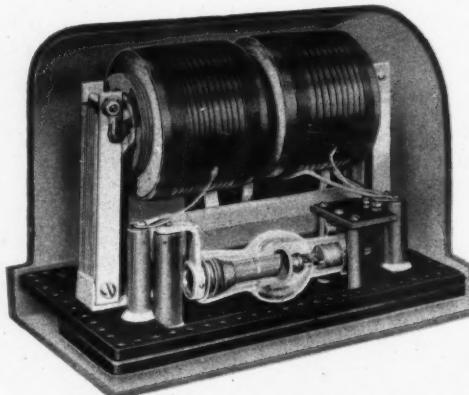
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# COMPLETE FULL DENTURE TECHNIQUE

## II. UPPER IMPRESSION APPOINTMENT

C. J. STANSBERRY, D.D.S.  
Los Angeles

THE edentulous patient presents himself for impressions. 1. A modeling compound snap impression is taken of the lower ridge, a plaster cast is poured, carefully separated, and in the same impression a second cast is poured. On this second cast a vulcanite tray is made and the other cast is laid aside for use at the next appointment. This vulcanite tray should be waxed up of only one thickness of base-plate wax. The pouring of the first plaster cast will prove valuable in the lower impression technique and the vulcanite tray will later serve as a base-plate in the check-bite technique. Both of these procedures will be time-savers and not time-consumers.

A snap impression is taken of the upper with sufficient modeling compound slightly to over-extend all peripheral margins and to extend at least one-fourth inch beyond the intended postdam location. The impression is removed and thoroughly chilled; ice water is desirable but not necessary.

The snap impressions of both upper and lower may be taken at this appointment and the patient dismissed, thereby allowing the steps described under numbers 2 and 3 to be done at laboratory convenience. If the patient wears dentures these may sometimes be used in place of the snap impressions, depending on the fit; if the fit is poor as a result of absorptions the dentures should not be used.

2. Before the upper snap impression is taken scraps of clean modeling compound, sufficient to make a modeling compound ball the size of a golf ball, are placed in warm water and warmed to the consistency of putty. The ball is then quickly pressed into the chilled and wet impression to form a modeling compound cast (Fig. 12). This cast is then chilled and separated; it should carry the imprint of the entire periphery of the snap impression. Plaster may be substituted for the putty ball of modeling compound if desired, but for cleanliness, ease and speed I prefer modeling compound. Over this modeling compound cast a Giffin's flexible metal

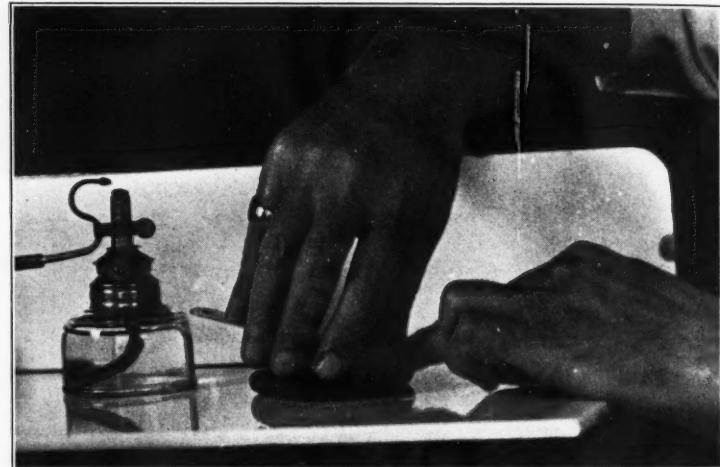


Fig. 12—Chilled upper snap impression being pressed on the soft ball of modeling compound to form the modeling compound cast.

tray is fitted. In this fitting no attempt is made to fit the vault of the palate except at the postdam area. The crest of the ridge is fitted and the edge of the tray is trimmed to extend about half way from the crest to the peripheral margin, or less if the examination of the mouth shows that this extension might interfere with muscle attachments (Fig. 13).

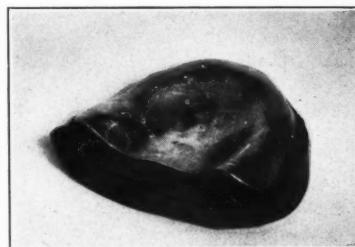


Fig. 13—A flexible metal tray fitted to the modeling compound cast. This is an illustration purposely used to show too short a tray at the postdam and too contoured a fit across the palate.

For those not familiar with the Giffin flexible trays it might be mentioned that they are made in two sizes and of metal similar to air chamber metal. They are easily adapted with a bur-

nisher or the handle of a vulcanite scraper (Fig. 14).

The reason that no attempt is made to fit the palatal portion is that in the final step, under number 11, the operator will wish this tray to spring under heavy pressure and rebound upon release. It will do this better the nearer it bridges from ridge to ridge in a straight line. With this technique the tray, supported around its entire periphery with modeling compound, is amply strong to sustain all the pressure necessary to take a good impression.

3. A soft roll of modeling compound, about finger size, is placed in the tray along the inner side of the buccal and labial flanges, and about the size of a pencil across the posterior border. With the tray thus prepared an impression is taken of the chilled, wet modeling compound cast. The impression is then chilled and removed. This preliminary impression should show a thickness of 3 mm. throughout; the flexibility of the tray will permit this even under fitted flanges.

The impression should bear the imprint of the ridges and the entire peripheral margin of the cast. It should

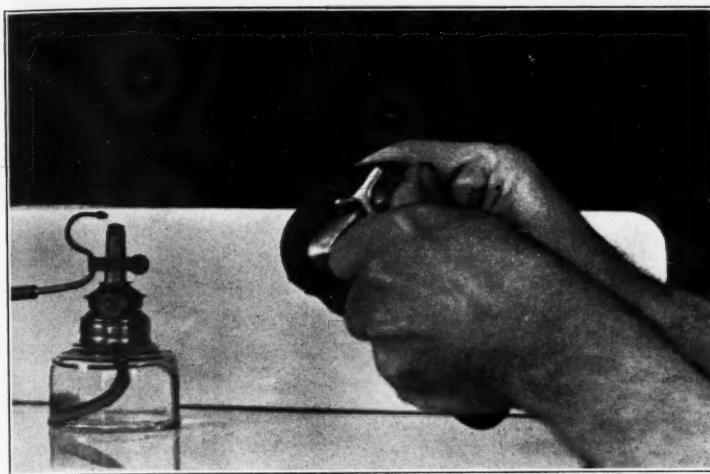


Fig. 14—Burnishing the Giffin tray to fit the modeling compound cast.

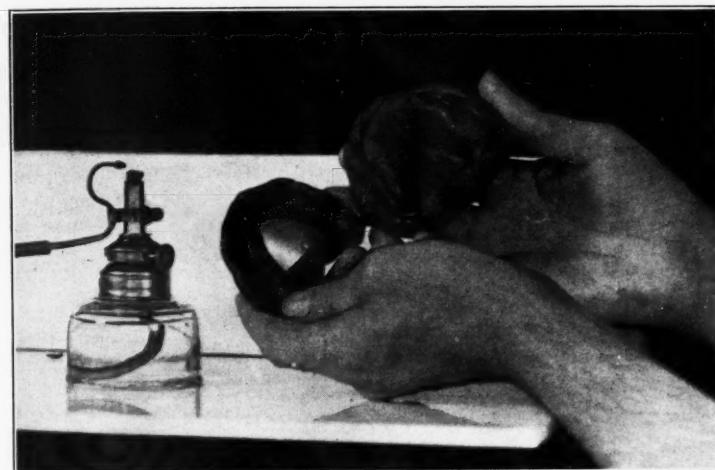


Fig. 15—Note particularly the amount of exposed palatal tray and the sharp detail of the modeling compound cast.

show a line of modeling compound across the posterior border about half an inch wide, but the palatal portion within the ridges should show exposed tray. This exposed surface of the tray should be surrounded by the modeling compound, and trimmed at right angles to the surface of the tray. This trimming should be done with a sharp knife and appear as in Fig. 15. The advantages of using the cast on which to fit and trim the margins of the tray and to make the preliminary impression are that one can more accurately and with greater ease do these things and place the tray to insure a uniformity of thickness of modeling compound than can be done in the mouth (Fig. 15). It should be remembered that the tray is extended a fourth of an inch beyond the estimated posterior margin of the denture, and on the tray there is now a half inch strip of modeling compound

in this location, so that the actual termination of the denture lies in the middle of the strip. The effect of having modeling compound beyond the denture area will be discussed later.

Any surplus of modeling compound around the periphery should be molded back over the outside of the metal flange. The thickness of this modeling compound flange should be between 3 and 6 mm. On the center of the lingual surface of the palatal area the tray is roughened about the size of a dime (18 mm.), and to this roughened spot enough sizzling hot modeling compound is attached to make a finger seat. As this modeling compound cools the tip of the finger is pressed into it from in front so as to make a seat for the finger-tip on which the tray can be balanced (Fig. 16 and Fig. 22-I). The making of the finger seat on which the impres-

sion can be balanced on the finger tip is the first entry into the technique of that most important requisite, balance. The use of this finger seat in the impression taking will, without further effort or thought on the part of the operator, automatically result in the same pressure being exerted on one side of the impression as on the other.

4. With the mouth blow-pipe the ridge groove of the impression, the inner surface of the flange, and the modeling compound across the post-dam are warmed moderately; the compound should be *barely moldable, not soft*. The impression is dipped in warm water and quickly placed in the mouth, pressed firmly to place and held under heavy pressure until the modeling compound is sufficiently cool to remove. The impression is now removed and chilled and kept as cold as possible throughout the succeeding steps except in that particular portion receiving attention. The modeling compound should show evidence of only a *slight* flow completely around the exposed palatal surface of the tray. It is important that the modeling compound be stiff to stand a heavy pressure, comparable to biting, and show only this slight movement. At this and all future entries into the mouth the finger seat should be used as this automatically insures equalized ridge pressure. At this stage the impression of ridge and post-dam is practically correct. The modeling compound can flow in both directions from the crest of the ridge and the middle of the postdam, which condition means that at these locations the modeling compound pressure is at its maximum. If the ridge is sharp, a groove is cut along this crest in the modeling compound with a 1.5 mm. spoon excavator to expose the tray. The compound is rewarmed



Fig. 16—An impression so placed will always exert the same pressure on one side as on the other and do it with no effort on the part of the operator. Notice the facial tissues, how suction brings both an inward and downward action simultaneously.

and placed with pressure *not quite* sufficient to *close this groove entirely* (Fig. 22-D).

5. At this point the patient is taught two movements: one a broad grin, and the other, to suck the operator's finger. To the patient I describe these movements as a smile and pulling in the cheeks by suction. With the finger supporting the impression an attempt to smile will be a grin and suction to pull in the cheeks is not possible without enclosing the finger with an air-tight seal. The patient is taught to execute the movements vigorously and rapidly, alternating about every three seconds. This may be practiced with the chilled impression in the mouth (Figs. 16 and 17).

The suction movement pulls down the periphery of the impression but does not permit the modeling compound flange to be sprung away from



Fig. 17—This action widens the imprints made by the muscle attachments along the buccal borders.

contact with the buccal surface of the ridge; on the contrary, the modeling compound is forced into closer contact with the tissue by the same downward force that molds its upper margin (Fig. 17). In this way this method has an advantage over the usual muscle trimming by grasping the cheek with thumb and fingers and pulling downward. To these movements may be added two others, dropping the mandible low, and reaching forward with puckered lips, although I seldom find that these movements produce any considerable change. The movements should always begin and end, however, with the suction movement.

The upper half of the buccal flange from cuspid to tuberosity is heated with the blow-pipe; heat is applied mostly on the outside and only slightly inside of the flange until when held sidewise the flange shows the first signs of sagging. The impression is dipped in water, inserted in

the mouth, and held firmly in place by the finger in its seat. The patient then performs the movements mentioned in the preceding paragraph, alternating every three seconds until the modeling compound is safely cool. The impression is removed, chilled and examined. If the peripheral modeling compound appears to have been so thoroughly imprisoned that no escape down the buccal flange of the tray was permitted, thereby causing undue peripheral extension, the outer third of the modeling compound roll is trimmed away, but its height should not be lowered; this is for the patient to do when this step is repeated. The opposite side is treated likewise.

6. The labial flange is heated from first bicuspid to first bicuspid so as to overlap the buccal treatment. Here, instead of suction, the patient opens the mouth and moderately draws the lip downward and inward while the operator gives a light lateral massage to widen the frenal notch. During this procedure the impression is kept well seated with a pressure directed upward and forward. With these lip tensions there is a tendency for surplus modeling compound to flow back to the bicuspid region. This overflow should be trimmed to continuity with the buccal margin and the trimmed area warmed and subjected to the movements used to form both labial and buccal margins.

The lateral massage of the lip is the only outside interference with the patient's own muscular actions in forming the entire periphery of the finished impression. This method of impression taking carries out my past contentions that an impression should register not only the form of the mouth but, equally important, it should register the muscle actions involved.

7. The heels are warmed to a

moldable consistency; the impression is inserted and held firmly. The patient is told to protrude as for incision. As a result of this protrusion the impression at the heels will usually present two definite flattened areas made by the advancing rami and will give a definite line for the termination of the denture directly back of the tuberosities. In this protrusion, modeling compound may be forced onto the buccal margins previously formed in a way similar to that in which the labial impression forced modeling compound over the bicuspid regions. This modeling compound should be trimmed away smoothly; however, a repetition of the buccal impression movement is rarely necessary.

To determine the length of the denture the modeling compound is moistened across the postdam region and marked with an indelible pencil where the denture is expected to terminate. The patient keeps the mouth open on the removal of the impression so that the operator may see the indelible marking that was transferred to the palate (Fig. 18). The nostrils are closed with thumb and finger and the patient is now instructed to blow air into the nose. This cannot be done with the mouth open unless the soft palate drops to close off the pharynx from the oral cavity. The position of the indelible line with reference to the junction of the immovable hard and movable soft palates is noted. If the operator has been accurate in placing this line it should be on the movable tissue just 1 mm. or 2 mm. beyond this junction. If this line is not correctly placed it should be erased and another drawn, with the first as a guide to the proper position.

It was previously mentioned that the line of greatest pressure is along

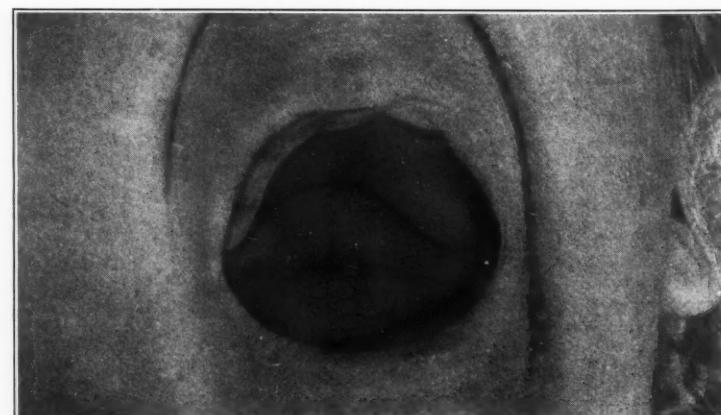


Fig. 18—To attain a result as illustrated, use care to free the tissue of mucus but leave it moist.



Fig. 19—Sliding the finger over the hole in the tray preparatory to releasing pressure.

the middle of the half inch postdam strip and that this strip extends a fourth of an inch beyond the estimated length of the finished denture. This extension has caused a greater compression along this line than if the impression had extended to this line only. The technique calls for an extension of 1 or 2 mm. overlapping the soft palate in average cases, but if the case exhibits soft ridges, especially the anterior, this extension may be 5 or 6 mm. as the degree of the softness of the ridge might indicate. Dentures following such extensions should be slightly thickened across the posterior margin, well rounded and highly polished, the polish extending well over and onto the palatal surface.

8. Immediately anterior to and following this line lay a strip of soft black wax, carding wax, three sixteenths of an inch wide and 20 gauge thick, to serve as an additional postdam. Warm this wax slightly, not sufficient to soften the underlying modeling compound, and once more firmly seat the impression. Remove, chill, and carefully trim away the modeling compound and tray extending distally to this line and the wax postdam. The use of black carding wax gives a bit of added security and guards against breaking this seal by overactive palatal muscles or excessive ridge compression. I prepare this wax from melted carding wax scraps into which I dip a smooth bottle filled with cold water; the bottle is soaped or oiled to prevent the wax from sticking.

9. *Preparation of Impression for Plaster Finish*—The impression is prepared for a plaster finish as follows:

A. The exposed palatal surface of the tray is extended distally to leave only a strip of modeling compound under the postdam wax across the

posterior, and laterally to leave only the modeling compound over the entire crest of the ridge; the exposed tray is extended also to include the anterior and posterior foramina.

- B. The edges of the modeling compound adjoining this space are slightly beveled.
- C. On the opposite side of the impression a hole one eighth of an inch in diameter is made through the tray in the center of the modeling compound finger seat.

*Preparation of Plaster of Paris*—Into one part water and one part saturated solution of potassium sulphate sift three parts by volume of Snow White plaster, number 1. Stir rapidly until the first faint sign of thickening appears; then pour into the palatal space of the impression only enough amply to finish that portion of the impression.

If any difficulty is encountered in the action of the plaster of Paris mix, I suggest that distilled water be used; also in the preparation of the potassium sulphate solution. In many parts

of the country the water is so highly mineralized or treated as to produce undesirable results in the plaster mix. If this method is new to the operator, I advise a practice mix or two to acquaint one's self with its behavior.

10. The impression is thoroughly seated, heel first, and the operator removes his finger from the finger seat, allowing the plaster under pressure to escape. With a heavy continuous pressure delivered as near to the hole as possible, but not covering it, all the plaster possible is caused to exude (Fig. 19). The small change of form of the impression tray is not visually evident but the exudate of plaster shows it to be present. Under pressure the impression is sprung and the supporting tissue compressed, but no pressure is delivered to the palate because the flowing plaster has free exit through the hole in the tray.

Without releasing this pressure, the operator slides or rolls the finger-tip to seal the hole and then, *not before*, releases the pressure but keeps the hole sealed until the plaster sets. When the hole is sealed by the fingertip and the pressure released, the rebound of tissue and tray exerts a *suction* or *negative pressure* on the en-

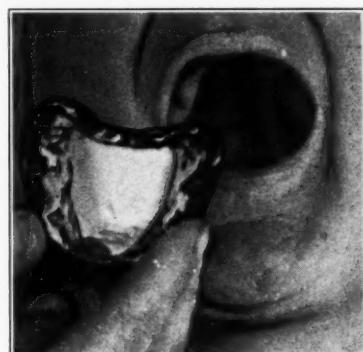


Fig. 20—A finished impression. The little flakes of plaster across the postdam and over the ridges are removed with a wet cotton roll.

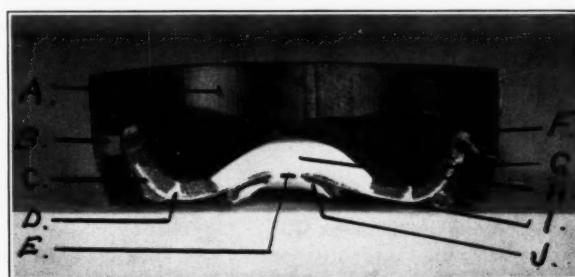


Fig. 21—Cross section of a boxed impression ready to pour: A, boxing wax; B, one-eighth inch square wax to form the valve seat of the cast; C, Giffin's flexible metal tray; D, closed grooves mentioned in step 4; E, plaster escape hole in the tray; F, location of valve seat in cast; G, modeling compound impression; H, Snow White plaster forming the palatal impression; I, modeling compound forming the finger seat; J, remains of plaster exudate under the imprint of the finger used to seal the opening.

closed plaster. This plaster transfers the suction or negative pressure to the median line of the palate and the adjacent tissues overlying the nerve and blood supply. This is an automatic relief based on the capacity of the tissue to expand. Lessening the pressure before covering the hole would allow air or plaster to reenter and thus defeat the object of this step. *This step of developing negative pressure is the most important of the impression technique.* In cases in which the median line is extremely hard there is no objection to further relief of this area; this I feel can be more uniformly and accurately accomplished by using various thick-

nesses of tin foil on the cast than by scraping the impression.

If the ridge and postdam impression described under step 4 are well executed and the plaster is of an easy flowing consistency the modeling compound will uniformly show through a thin film of plaster. This plaster film remaining on the ridge and postdam impression does not mean that these areas need further compression, as plaster when compressed into thin layers loses water; that is, mechanically the water is forced out, leaving little islands of moist plaster too dry to flow. These little residues overcompress the particular areas over which they happen

to lodge and should be removed with a wet cotton roll (Fig. 20).

11. The finished impression is prepared by laying around it a strip of wax, one-eighth inch square, just below the periphery and beyond the post-dam margin, to form the valve seat in the cast. This entire preparation is boxed in, the separating varnish applied, and the cast poured (Fig. 21). It is important that this cast material should be one that does not change form nor disintegrate during vulcanization or curing.

The next installment will describe the technique of the lower impression.

(End of Second Installment)

604 Medico-Dental Building.

## REMOVAL OF IMPACTED BICUSPID

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New York

THE application of force to approach the tooth that is completely encased in bone as in the accompanying roentgenogram calls for the use of a mallet and chisel, a hand chisel, or an engine-driven drill. For many years I have preferred the motor drill force because of its simple features, and it is recommended to the general practitioner because the dental engine is routine in his practice.

In the case illustrated here the removal of the impacted bicuspid was accomplished in less than eight minutes without any undue haste. The mucoperiosteum was reflected from the buccal plate to make a wide exposure of the operative field. The drill was entered in at several points around the coronal portion of the tooth, and the buccal plate at each point was pried off with an elevator. When the crown was thus brought to view, the drill was entered at the cemento-enamel junction. The purpose of this was to create an opening at this point so that an instrument might be applied to split off the crown. After the crown was removed, the drill was again applied to the bone overlying the root and permitted to engage the root substance slightly. The patholever was then introduced into this opening, and the root moved forward from its crypt into the space made by the removal of the crown.

The advantage of doing the operation as described here is that it is not necessary to remove so much bone. To remove the tooth in one piece would require excision of the buccal bony plate to a much greater extent than is required by this drill technique of splitting the tooth.

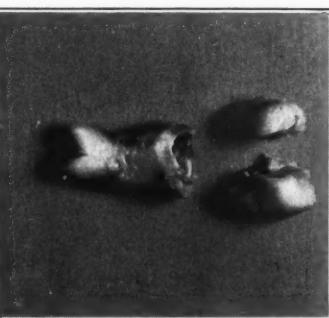
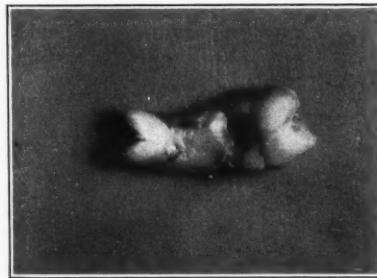


Fig. 1—Tooth in sections as removed by splitting technique.



Fig. 3—A, Preoperative roentgenogram; B, postoperative roentgenogram.

# COPPER AMALGAM AND HIGH SILVER AMALGAM WITH PARTICULAR REFERENCE TO CHILDREN'S DENTISTRY

C. WILFORD WILSON, D.D.S.

Detroit

**T**HIS investigation of copper amalgam and high silver amalgam was undertaken because of the wide difference in opinion as to which of the two is the better suited for filling material in children's teeth. The literature<sup>1</sup> has been thoroughly searched; all information possible has been obtained from the manufacturers<sup>2</sup> and men<sup>3</sup> who are considered authorities in metallurgy and research. The information is given here for whatever practical application it may have in the practice of children's dentistry today.

## REVIEW OF THE LITERATURE

The outstanding facts on the subject were found in the replies from the American Dental Association and the Bureau of Standards in Washington. The Bureau of Standards replied as follows: "There is very little information in the references available on Copper Amalgam. Item No. 13 gives some data on this material." These data were thoroughly examined and will be given later. The American Dental Association replied, "Practically nothing is being published in the dental literature on the subject of copper amalgam. Before 1900 there were many articles on this subject, but, unfortunately, the Library Bureau has only a limited number of them; however, these clippings will familiarize you with the main characteristics of copper amalgam." These facts also will be given later.

The recent work<sup>4</sup> that has been done on high silver amalgams and the

<sup>1</sup>A. D. A. Library and the Bureau of Standards.

<sup>2</sup>Cleveland Dental Mfg. Co., W. V-B. Ames Co., Minimax Co., L. D. Caulk Co., Garhart Dental Specialty Co., S. S. White Dental Mfg. Co.

<sup>3</sup>C. L. Drain, D.D.S., The State University of Iowa; M. L. Ward, D.D.Sc., University of Michigan; A. D. Black, D.D.S., M.D., Northwestern University; K. W. Ray, D.D.S., Northwestern University; U. G. Rickert, D.D.S., University of Michigan.

<sup>4</sup>Ward, M. L., D.D.Sc., and Scott, E. O., M.S.: Effects of Variations in Manipulation on Dimensional Changes, Crushing Strength and Flow of Amalgams, Ann Arbor, Michigan, J. A. D. A. 19:1683-1705 (October) 1932.

results obtained are well known. Specification number 356 and the subsequent bulletins issued cover this material thoroughly. It is of passing interest, however, to note the pledge that was signed by all members of the American Society of Dental Surgeons in 1845. The signing of the following resolution was compulsory or expulsion from the Society was automatic: "Resolved: That any member of this society who shall hereafter refuse to sign a certificate pledging himself not to use any amalgam and, moreover, protesting against its use under any circumstances in Dental Practice, shall be expelled from this Society." Thus the development of amalgam can be traced from that time to the development of specification number 356. These specifications and subsequent bulletins are the guiding post of today for high silver amalgams and the conscientious operator today will use only high silver alloys that come up to those qualifications.

The first information<sup>5</sup> available on copper amalgam is taken from the *Dental Cosmos*. The material was denounced by some, while others believed it to be superior to any other. Tests proved it worthless and tests proved it perfect. The opposing claims were as follows: "No antiseptic properties, soluble in certain mouths, detached particles discolored other teeth, danger of absorption, subject to shrinkage allowing moisture to permeate the tubules, and the tendency to soften at the cervical."

The following were the arguments in favor of the use of copper amalgam: "Leakage was present only where packed too soft or too wet, discoloration resulted from three causes: (1) defective manipulation, (2) teeth of poor structure which were permeable to water, resulting in oxidation which is beneficial as it hardens the tooth, (3) impure preparation." Those in favor advocated covering the copper amalgam with

<sup>5</sup>Dental Cosmos (January) 1891.

gold or silver and stated they never found cervical softening where the saliva was alkaline. The opinion of the majority at that time was that it was indicated in cavities on the buccal surface, in large approximal cavities that extended under the gum line and in cavities that were beyond the reach of the toothbrush.

The directions for manipulation were as follows:

Heat slightly and grind vigorously, the more the better; squeeze until the consistency of putty and insert a small piece at a time. In combination fillings the copper amalgam must set thoroughly first or the filling will be porous. If the cavity is filled dry, decay will continue; if filled wet, decay will stop.

In 1893 the opinion<sup>6</sup> was expressed that:

The many and almost universally dissentious writings about copper amalgam indicate that the majority of those who ever did use it have now discarded it, and by the time they have finished repairing the last copper amalgam filling that has cupped they will have to enlarge their vocabulary or they will be unable to express themselves. Copper amalgam as a filling material used only without a covering of gold or silver is of no value.

There is no further material<sup>7</sup> available until 1926:

Copper amalgam differs so markedly from all other amalgams, both in composition and behavior that it deserves separate consideration. It is an alloy of copper and mercury and can be made by adding freshly precipitated and washed metallic copper to an excess of mercury until the solution is complete. A far better method is the electrolytic method and copper made by this method changes very little in volume if at all. It is antiseptic. These two qualities make one of the best tooth preservers now in use, although it has other qualities so undesirable as to exclude its use in a great majority of cases. It turns almost black in the mouth, has a peculiar metallic taste, is sometimes a marked cause of voltaic disturbance and recent observations indicated that this material either shrinks or cannot be packed on account of its springy nature.

It must be borne in mind at this point that all information given up

<sup>6</sup>Dental Cosmos, 1893.

<sup>7</sup>Ward, M. L.: American Textbook of Operative Dentistry, ed. 6, pp. 511-513.

to this time is merely expression of opinion; it is not information of a scientific nature. This applies to both copper amalgam and the silver alloys, as it is now known that the instruments available previous to 1928 were neither scientific nor standard in the hands of different men. The data that follow are of a scientific nature and can be relied on because of the standardization of instruments and techniques for testing.

The only available data during 1927 and 1928 were summed up as follows:

"With copper amalgam it is almost impossible to build permanent contact points in deciduous teeth." The following<sup>8</sup> was published in 1929:

Copper amalgam shows a continuous shrinkage for a period of twenty-four hours, although the total change is less than in many of the unsatisfactory High Silver alloys. Their flow values are satisfactory. The crushing strength values are fairly high but erratic, owing, perhaps to difficulty in heating the material uniformly in amalgamating them according to the directions furnished. The edges chip easily and the alloys do not machine well. The manipulatory methods used in handling copper amalgams are such that it is very difficult to produce two samples from the same alloy having the same or nearly the same physical properties. We may therefore expect a wide variation in strength, setting time and other characteristics in our finished products.

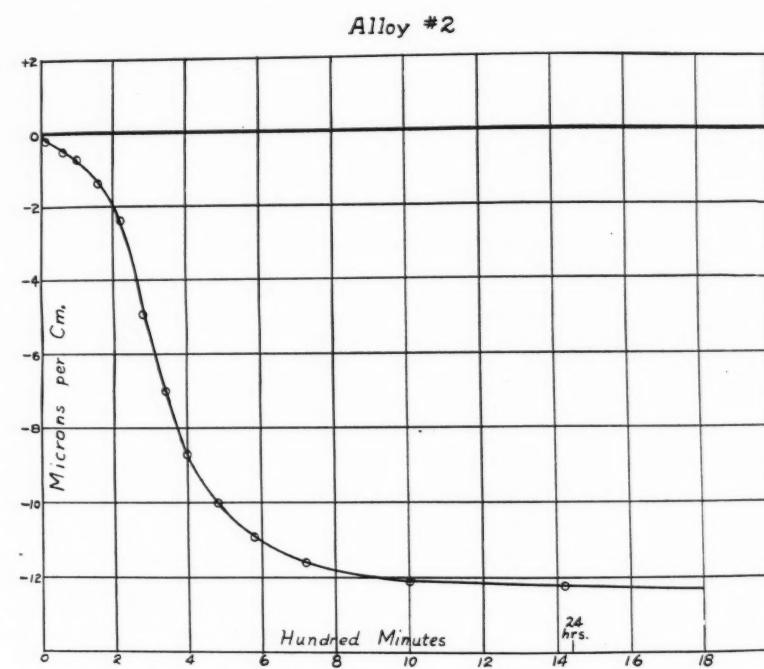
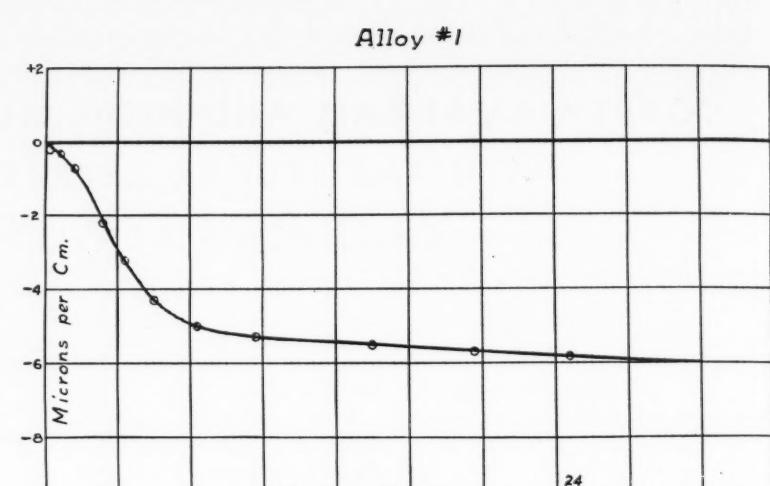
The foregoing statements are all taken from the dental literature and give the consensus on copper amalgam from 1891 to 1929. These statements show that copper amalgam was highly thought of when first introduced and went through the same line of thought as high silver, but the difference lies in the fact that the scientific requirement for high silver was finally standardized and approved whereas copper amalgam up to this time has lost practically all the scientific support that it had at the beginning and cannot be compared to any of the high silvers that do meet specification number 356.

I have made every attempt to secure whatever facts are available as to the work being done at the present time. As stated at the beginning, questionnaires were sent to the leading manufacturers and authorities of the present, and the following conclusions are drawn:

1. With the possible exception of one reply,<sup>9</sup> the statement was made that copper amalgams do shrink and at no time show an expansion. I studied the accompanying graphs of Doctor Coggan of the University of

<sup>8</sup>Taylor, N. O.: A Report to the Research Commission of the American Dental Association (A Survey of Amalgam Alloys), J. A. D. A. 16:595 (April) 1929.

<sup>9</sup>Ray (footnote 3).



Twenty-four hour test on two copper amalgam mixes showing amount of shrinkage.

The curves that are plotted are an average of a series of tests carried out at the University of Michigan.

**Manipulation:** (1) Pellets heated in test tube until small globules of mercury appeared on the surface; (2) triturated in mortar for 60 seconds; (3) mulled in hand, 00 seconds (not at all); (4) packing pressure, 8-10 pounds on 2 mm. plugger; (5) excess mercury expressed by wringing in chamois, finger pressure being used.

**Flow:** From 0.1 per cent to 0.5 per cent.

**Crushing resistance:** From 47000 to 48000 pounds per square inch. Average usually varies between 45000 and 51000 pounds per square inch.

**Specifications:** All tests run according to testing specifications for silver amalgam; namely, Federal Specifications No. 356.

Michigan, and they show that there is no expansion at any time and the shrinkage varies from 5 to as high as 14 microns. This shrinkage has stopped all further consideration of copper amalgam at the Bureau of Standards.<sup>10</sup>

2. The black deposits that form on copper amalgam restorations are a combination of cuprous and cupric oxide. This material is highly antiseptic and is the activating agent that is beneficial. This antiseptic action can only be obtained, however, in a cavity that *leaks*, and a copper amalgam restoration that does not leak has no antiseptic value. These antiseptic properties have in the past seemed advisable, but are they in the light of present day observations which indicate that copper amalgam in producing cupric oxide also produces what is considered by some authorities at the present time an almost perfect embalmer? These authorities assert that the action of this material is almost the same as that of arsenic only much slower. They believe that it will cause the painless death of the pulp. Traces of cupric oxide can be found in the pulp chamber underneath a copper restoration.<sup>11</sup>

It has never been proved as stated by some writers that copper can be placed closer to the pulp of the tooth than any other filling material.<sup>12</sup> It may not irritate and cause pain as some other materials but, as stated before, in many cases may cause the painless death of the pulp. A particle of silver can be inserted underneath the skin of a dog and the tissue will tolerate it, but a piece of copper so placed will cause a reaction of some type that is radiopaque. It is not known definitely at this time what this reaction is, but it is visible under the roentgen ray.

<sup>10</sup>Kenneth Easlick, University of Michigan.  
<sup>11</sup>Ward, M. L.: Footnote 3 (Personal communication to author).

<sup>12</sup>Rickert: Footnote 3.

5013 Grand River.

3. The procedure in chronic cases of systemic disease at one of our leading institutions<sup>13</sup> today is as follows: First, all black restorations are removed; secondly, all gold crowns are removed; thirdly, all large metallic restorations are removed. This is done because of the belief that it is not the pulpless tooth that is causing all the trouble, but is more apt to be the dying pulp. In many cases the treatment of a tooth of this type will eliminate the disturbance. Some of the foremost dental operators of today insist that all restorations should be lined for this reason. It is known that copper amalgam does penetrate the tubules and the pulp chamber and may cause the painless death of the pulp. To prevent this cavities should be lined, but if they are lined the antiseptic action that is desired is lost. Should it, then, be used?

#### SUMMARY AND CONCLUSIONS

The foregoing observations, in the light of the past belief with regard to children's dentistry may seem incredible, but it may be that copper amalgam is causing many pulps to die; the teeth may show abscesses under small restorations, but one does not have the opportunity usually to see the tooth until the abscess has developed. Investigators believe today that a great many of the pulps under these restorations are devitalized but few chronic cases are found in children; they are not detected. Would this not be possible in the case of a painless devitalization?

All copper amalgam restorations will cup; it is impossible to maintain a contact point; the edges are brittle; the copper amalgam cannot be packed but has to be used more as a paste; it has decided shrinkage with no expansion; it may painlessly kill the

<sup>13</sup>University of Michigan Dental Clinic.

pulp; all restorations should be lined; black-appearing restorations are now the first to be removed in chronic cases in adults; tissue will not tolerate copper; it has a definite voltaic characteristic.

Should copper amalgam be used routinely in children's dentistry? This question was asked of the dean<sup>11</sup> of one of our leading dental schools and he replied:

If we want to put in a filling that leaks, not remove all decay, run the risk of a painless devitalization, not line our cavities and have a black filling, then copper amalgam should be used; otherwise it seems advisable at the present time to use a material that meets the standards suggested by the Bureau and adopted by the American Dental Association. This material which has been approved is one of the high silver amalgams that have been tested and found adequate. This amalgam today with a proper cavity liner seems to be the proper plastic filling material for the posterior teeth of children. I think I may say that almost no one except a few of those practicing children's dentistry use copper amalgam, for it has well known objections from the standpoint of discoloration which is caused very largely by the shrinkage of the material.

Those who practice children's dentistry and use this material have never explained a thing about it except their experience in saving teeth. The ability of copper amalgam to save teeth must be granted, for it has two qualities for this purpose: (1) it is antiseptic and (2) it shrinks. Equally enthusiastic are those who practice children's dentistry and use a high silver amalgam either alone or with a cement lining. There is no evidence to show that one method is more effective than the other in the prevention of caries. In the preservation of occlusion, preservation of contact, elimination of electrical disturbances, and elimination of possible death of the pulp, the evidence is practically all in favor of the high silver amalgam with the cement lining.

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# A NEW CONCEPT OF DENTAL MEDICINE

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and

ADA M. WIELAGE, PHARM. CAND.

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THE medical and dental literature contains a mass of more or less uncorrelated information, which is conflicting and creates a tendency in the practitioner to memorize symptoms rather than to think medicine or dentistry. An effort has been made to approach this chaotic state with a view to establishing a guiding line, so that with the inevitable progress of dental medicine, the practitioner will be able to think rather than memorize. The facts and ideas compiled may at this moment seem far-fetched to one whose professional career has been exclusively devoted to the improvement in inlay technique or the taking of faultless impressions and construction of complicated dental restorations.

Chart 1 is the key chart that has been developed as an aid in this particular project.

The smallest unit of the cell colony which is the cell receives outside irritations to which it must respond. This effort of responding to these outside irritations determines whether the cell will exist in health, in disease, or will perish. The schematic drawing of the cell shows the influence of certain outside irritations and their effect.

If the cell's mechanism is able to answer satisfactorily to these irritations, a state of harmony exists in which life is able to manifest itself in health; if partly successful, there is disease; if not successful, the result is death. The same fundamental law of response to irritations goes as well for the single cell as for a community of cells, and will finally go for the colonies belonging to the vegetable kingdom and animal kingdom and then for the cell colony called human life. Are we aware of such a mechanism in the human body?

The literature is replete with such terms as: sympathetic-parasympathetic, catabolic-anabolic, positive-negative, hypertension-hypotension, heat-cold, fast-slow, acid-base. It is realized that there is more or less parallel action between the opposites on the one side and the opposites on the other side; therefore, the scale in

Chart 1 shows this division. How the balancing effect can be changed is indicated under the scale. What the action of adrenalin and stimulants is; what the effect of the drugs of the muscarine group is, and what the effect of atropine is. There seems to be a relation between the left group of factors and also between the right group of factors.

To measure the balance between left and right and express this in a figure is difficult except in the expression of one pair and that is acid-base. The acid-base equilibrium and its disturbance becomes, therefore, of vital importance. The needle of the balance points to a scale which shows health, disease, and death, and it will

be noticed that in both directions, there is illness and death. The health section is divided in two parts, marked "M" for male and "F" for female.

Life manifests itself in a colloidal state. The complicated balancing mechanism allows the body to swing back and forth in this range, even allows it at times to leave it in either direction, perfectly able to regain its equilibrium. There is a factor that has been overlooked when it comes to disease, and that is the time element or the fourth dimensional aspect of life. The disturbed equilibrium in one direction during a prolonged period of time produces illness. The body is not able to manifest life as

## ORALOGY

### A Cell

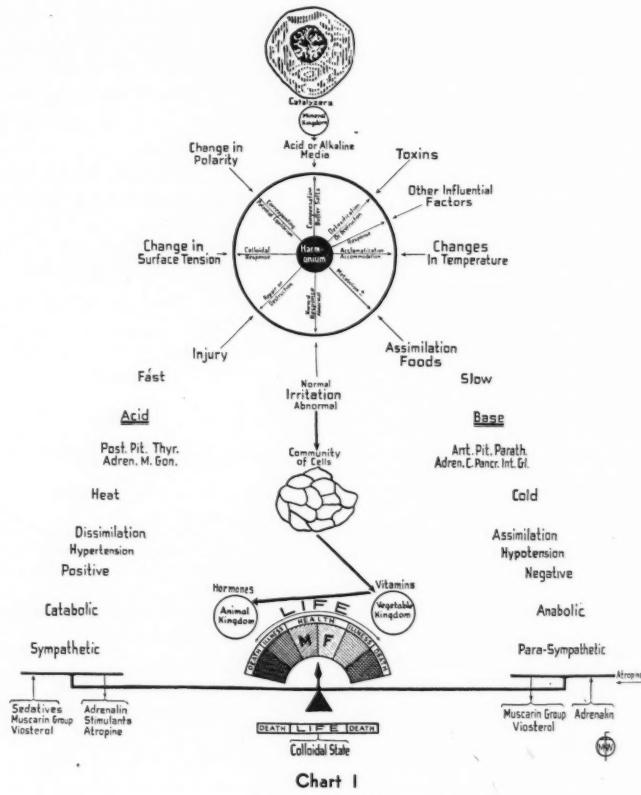


Chart 1

"health" because of the prolonged disturbance of its acid-base equilibrium.

Chart 1 suggests therefore, that pathology should be divided into two main groups of diseases; that is, into those diseases that are manifestations of a prolonged disturbance, in either the acid direction or in the base direction, of the acid-base equilibrium. Otherwise expressed, pathology should be divided into diseases that are the result of a change of the normal colloidal state in the direction of gross dispersion through flocculation or a change in the direction of molecular dispersoids through peptization. If this is true, then medical and dental pathology will be revolutionized as well as medical and dental therapeutics.

Diseases should be classified according to whether they are the results of acidosis or alkalosis; whether they develop in an acid soil or in an alkaline soil; whether they are the results of a flocculation or a peptization. Therapeutics, then, should try to bring the body back to a normal acid-base equilibrium or colloidal equilibrium.

Drugs should be used as levers to aid in this accomplishment, thereby measuring from time to time its progress scientifically. This has been practiced in a different way, but mostly depended on urinalysis, chemistry of the blood, and temperature. A change in approach is therefore suggested and simplification should be the result.

Chart 2 represents a schematic distribution of the autonomic nervous system, after Edinger (Meyer and Gottlieb<sup>1</sup>).

In contradistinction to the cerebrospinal nervous system, which is dependent on the will, stands the autonomic nervous system which guards the involuntary functions of the organism. The latter regulates the heartbeat and distribution of the blood, the function of glands, the digestive mechanism, metabolism, and body temperature.

Though the functions of the implicated organs are more or less independent of the cerebrospinal nervous system, still the autonomic nervous system in all its actions is influenced by the former. The division of the autonomic nervous system into cranial, sacral, and thoracolumbar parts is physiologic rather than anatomic as has been determined by the response to drugs.

The origin and distribution of the autonomic nerve fibers is as follows:

From the midbrain come the parasympathetic fibers, by way of the

<sup>1</sup>Meyer, H. H.; and Gottlieb, R.: *Experimentelle Pharmakologie*, ed. 7, Berlin and Vienna, Urban and Schwarzenberg, 1925.

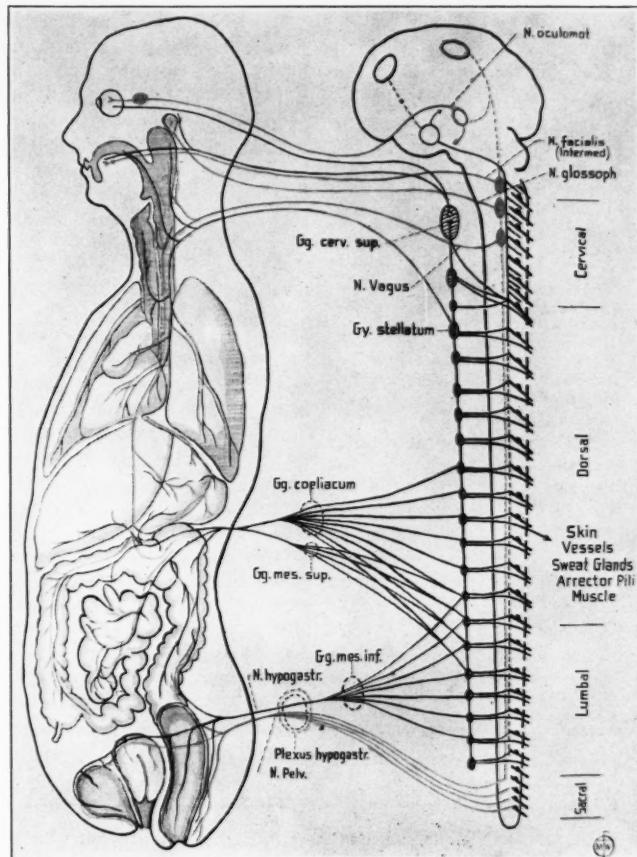


Chart 2—Distribution of the Autonomic Nervous System.  
(From Meyer and Gottlieb)

oculomotor nerve to the ciliary ganglion, supplying as short ciliary nerves the sphincter iridis and the ciliary muscle.

In the medulla oblongata originate the parasympathetic fibers, which, by way of the chorda tympani, supply the secretory fibers to the salivary glands and vasodilator fibers to the oral cavity.

From the facial nerve and glossopharyngeal nerve originate the secretory fibers and vasodilators which run in the trigeminal nerve to supply the mucous membranes (mouth, nose, and pharynx).

Finally in the medulla oblongata originate the parasympathetic fibers which follow the tract of the vagus nerve to the intestines and supply depressors for the heart; constrictors for the bronchial muscles; motor fibers for the esophagus, stomach, and intestines; and secretory fibers for the stomach and pancreas. This part of the parasympathetic system has been called the cranial-bulbar section. Its influence is strongest at the beginning of the digestive tract and in the associated parts of the head, and loses its

extent and intensity in proportion to its distance. As it nears the end of the digestive tract, its influence is gradually replaced by the influence of sacral-parasympathetic section; that is, the sacral nerves and pelvic nerve which originate from the spinal cord and influence the descending colon, rectum and anus, and innervate the bladder and genital organs.

The sympathetic nerves form a physiologic unit; their nerve endings react to adrenalin. The parasympathetic nerve endings react to the drugs belonging to the muscarine group.

#### CALCIUM METABOLISM

The subject of calcium metabolism is one of utmost importance not only in general medicine but also in dental medicine. Although much is written about the different reactions and biologic needs in relation to the proper functioning of the body, it will not be amiss at this time to cover some of the fundamental phases of colloidal chemistry in order that a better understanding of the phenomena relative to mineral metabolism may be had.

The normal life processes take place

in a colloidal foundation as do pathologic changes. What are colloids? Ostwald and Fisher<sup>2</sup> describe them as follows:

According to modern colloid chemistry they belong, with mechanical suspensions and molecular solutions, to the group of the dispersed systems, differing from the suspensions and the molecular solutions only in the special value of their degree of dispersion . . . The colloids differ from the coarse dispersions in that they cannot be analyzed microscopically and in that they pass through ordinary filters. The colloids differ from molecular dispersed systems in that they do not diffuse and do not dialyse, which molecular solutions do.

It has been agreed, arbitrarily, that the colloid particle shall have a diameter on the one hand of 1/10,000 of a millimeter and on the other hand of 1/1,000,000 of a millimeter. A 1/1,000 of a millimeter is called  $1 \mu$  (micron). A 1/1,000 of a  $\mu$  (micron) is called  $1 \mu\mu$  (millimicron); therefore, the diameter of the particles of typical colloids lie between  $0.1 \mu$  and  $1.0 \mu\mu$ . The accompanying table will be of interest in this connection.

(3) gas plus solid; (4) solids plus liquids (suspensoids); (5) liquid plus liquid (emulsoids); (6) gas plus liquid (foam); (7) solid plus gas (smoke); (8) liquid plus gas (fog).

Colloids have an electrical charge. Negatively charged colloids ascend with their dispersion media, while positively charged colloids are held fast near the surface of the liquid and therefore separate from their dispersion media.

Are colloids ions or not? This depends on what is meant by ions. If by ions we mean only those material carriers of electricity which (following the laws of Faraday, as do the ions in salt solutions) must always carry equivalent amounts of electricity, then colloids and coarsely dispersed particles are not considered ions.

The colloidal particles are composed of groups of molecules as a nucleus, the total size of which is always between  $0.1 \mu$  and  $1.0 \mu\mu$ . Around this mass of molecules, which has a certain electrical charge, there

dition with the great "arthritic state." In some such manner are understood the theories of antibodies, antigens, stimulins, also phagocytosis, and eventually the selective action of micro-organisms on certain tissue cells will thus be explained.

Body cell membranes have a specific charge, opposite and in proportion to their nuclear charge. Micro-organisms have their nuclei and cytoplasm and have their specific nuclear and membrane charges. They are alive, have a right to live, and no doubt have a desire to live as strong as we human beings manifest. In a normal condition, therefore, there must be a place for micro-organisms, human beings, and other cell colonies. In fact science has demonstrated that certain micro-organisms aid body function (intestinal tract). Bacteriology has stamped micro-organisms as our enemies. It is probable that a disturbance of the state of harmony is responsible for the increased activity of these organisms at certain times. The degree of disturbance is in direct proportion to this manifested virulence.

The fact that many persons are exposed and few contract a contagious disease; the fact that we carry a number of so-called disease-producing organisms without manifestation of the disease symptoms, and the fact that there are so-called carriers—these make the belief that the mere presence of micro-organisms is harmful somewhat questionable although it is reasonable to regard their presence as a potential danger.

The splendid research work of Hulin<sup>3</sup> carried out at the Salpêtrière Hospital Laboratories in Paris, France, by which he proved, for instance, that the underlying systemic condition (which Gottlieb<sup>4</sup> calls the "factor X" and Broderick<sup>5</sup> called the "unknown factor"<sup>6</sup>) of the manifestation of parodontosis is of anaphylactic origin, may well lead future research on caries in a similar direction. There is no question that the laws of colloidal chemistry must be better understood before progress can be attained.

The work of Carrel<sup>7</sup> in creating the "New Cytology," for which he received the Nobel Prize and through which he added to the study of the behavior of life cells to different sur-

COARSE DISPERSIONS	COLLOIDS	MOLECULAR DISPERSOIDS
→		
INCREASE IN DEGREE OF DISPERSION		
Periods greater than $0.1 \mu$ ; do not pass through paper filters; microscopically analysable.	$0.1 \mu$ to $1.0 \mu\mu$ Pass through paper filters; cannot be analysed microscopically; do not diffuse; are not dialysable.	Periods smaller than $1.0 \mu\mu$ ; pass through filter paper; cannot be analysed microscopically; diffuse and are dialysable.

The divisions shown in the accompanying table are, of course, purely arbitrary. Transition systems of every degree of dispersity exist, not only between colloids and coarse dispersions but also between colloids and molecular dispersoids. Coarse dispersions of solid particles in a liquid are known as *suspensions*; colloid dispersions of the one in the other are known as *suspension colloids* or *suspensoids*. Liquid plus liquid which hardly mix with each other in molecular form, upon shaking form *emulsions*. Liquid colloids form *emulsoids*. Liquid plus gas forms *foam*. The dispersion medium may be solid, liquid, or gaseous. Eight combinations are possible. The dispersed material is named first; the dispersion medium is second: (1) solid plus solid; (2) liquid plus solid;

is a layer or cushion that carries an electrical charge opposite to the one just mentioned. This layer or cushion is called the *perigranular layer*, and it is assumed that these charges of the colloidal perigranular layers prevent them from attracting one another, securing colloidal stability. In the body fluids, in which these colloidal particles are suspended, are also found free molecules which manifest Brownian movement and thus bombard the colloid particles.

Some of the reactions that are manifested from time to time in the body are the results of discharge of perigranular layers, producing flocculation of molecular groups and finally precipitation. Other reactions are produced by an increased dispersion of colloids through peptization resulting in molecular dispersoids. This is readily achieved when colloidal instability is present, thus linking this con-

<sup>2</sup>Ostwald, Wolfgang; and Fischer, M. H.: Introduction of Theoretical and Applied Colloid Chemistry, ed. 2, New York, John Wiley & Sons, Inc., 1922, p. 21. Handbook of Colloid Chemistry, P. Blakiston's Son & Co., 1919.

<sup>3</sup>Hulin, Ch.: Recherches sur la Pyorrhée Alvéolaire, ed. Semeaine Dentaire, Paris, 1930, pp. 106-113.

<sup>4</sup>Quoted by Broderick, footnote 5, page 166.

<sup>5</sup>Broderick, F. W.: Dental Medicine, St. Louis, C. V. Mosby Company, 1928.

<sup>6</sup>Hulin, Ch.: La Théorie Gingivale, Eighth Internat. Dent. Congress, Section IV, Paris, 1931, pp. 61-66.

<sup>7</sup>Carrel, Alexis: La Cytologie Nouvelle, Arch. de l'Inst. Prophylactique, 3, No. 4, Quatrième Trimètre, Paris, Masson et Cie, 1931.

roundings the study of histopathology, proves that established scientific understandings are subject to change. The development of physicochemistry and biochemistry throws light on many perplexing problems about which bacteriology was limited in its explanation. In other words, science is stepping from the bacteriologic era into the physicochemical and biochemical era, for in its last instance it is the action of the bacteria (albumin) and its product (toxin) upon the organism (Toxalbumin).

With the approach advocated in the new concept of dental medicine, many apparently unrelated facts in different theories show a possible relationship. Readers of dental literature have noticed the percentage of failures in all experiments conducted for the elimination and prevention of caries and pyorrhea; nevertheless, these readers are aware that each theory seems to contain part of the truth.

Prinz<sup>8</sup> points to a lack of saliva as the cause of dental caries. Others adhere to Miller's theory,<sup>9</sup> which, as accepted today, is to the effect that . . . caries of the enamel consists in its entirety of the dissolution of the enamel by lactic acid formed in situ by the fermentation of carbohydrates which adhere to the surface of the enamel; and that caries of dentin and cementum consists of two distinct steps:

1. The dissolution of the inorganic salts from these tissues, and
2. A subsequent action by proteolytic bacterial enzymes upon the organic constituent of the dentin and cementum of the tooth.

Still others point to results obtained with diet adjustment; while the adherents of the specific vitamin theory have their say. Our concept of dental medicine (Charts 1 and 3) brings out the fact that all theories are probably right to a certain degree.

It will be noted that there is in Chart 1, above the schematic drawing of the cell, a circle in which is written "Mineral Kingdom." Above the circle is the word "catalyzers." Arrows point downward to two circles marked "Vegetable Kingdom" and "Animal Kingdom," above which are respectively placed the words "Vitamins" and "Hormones."

There is probably a similarity between the actions of catalyzers, vitamins, and hormones. Indeed in this concept the theory is adhered to that the catalyzers in the mineral kingdom have become vitamins in the vegetable kingdom and hormones in the animal kingdom. Also according to this concept these chemical catalyzers are

necessary to produce vitamins and these chemical catalyzers and vitamins are necessary to produce hormones. This may be a bold step, but by studying the symptoms produced by hypoaction of certain endocrines and lack of certain vitamins, one can come to the conclusion that this theory can be used in placing certain vitamins opposite certain endocrine glands.

Chart 3 is the result of this study in which vitamins B<sub>1</sub> and B<sub>2</sub> are placed next to the posterior pituitary; vitamin A next to the thyroid; vitamin C next to the adrenal medulla; vitamin E next to the gonads; vitamin D next to the adrenal cortex and parathyroids.<sup>10</sup>

No vitamins were available for the anterior pituitary as yet nor for the interstitial glands of Leydig, but chlorophyll with a question mark has been placed next to the islands of Langerhans, and this relation will be covered at some future time.

An understanding of this relation between vitamins and hormones makes it possible to understand what medical science is trying to achieve with high vitamin therapy.

Sugar metabolism must be definitely linked with calcium and phosphorus metabolism to reach a solution. The apparent missing factor between parathormone and vitamin D may be found in this new relationship. Vitamin B will probably play an important rôle in the combatment of dental caries and rickets. The high amount of lactose in breast milk compared to the lack of it in cow's milk may substantiate this theory.

It also becomes apparent that if Nature saw fit to assign a special endocrine gland, the adrenal medulla to the hormone adrenalin, which stimulates the sympathetic nervous system, we may well look forward to the discovery that choline (belonging to the muscarine group), which stimulates the parasympathetic nervous system, may have its origin in an endocrine gland.

In Chart 3 choline (with a question mark) has been placed next to the adrenal cortex. In studying the symptoms produced by a disturbance of vitamin A metabolism (Chart 3), it will be noticed that vitamin A has a specific action in preventing infections of the eyes, sinuses, air passages, and lungs.

The tissues derived from endoderm are those of the digestive tract (except the mouth and anus) and organs that are more intimately connected with them. Vitamin A is considered

<sup>8</sup>Prinz, Herman: Quoted by Broderick, footnote 5, pp. 124-125.

<sup>9</sup>Endelman, Julio; and Wagner, A. F.: General and Dental Pathology, St. Louis, C. V. Mosby Company, 120, p. 310.

<sup>10</sup>Weston, William: Vitamin Exhibit, Minneapolis meeting, A. M. A., 1928.

to have a relation to the endoderm and structures derived from the endoderm.

The symptoms of a deficiency of vitamin C show a relation between vitamin C and the mesoderm and therefore with the structures derived from the mesoderm; namely, the muscular and circulatory portions of the body, the reproductive organs, and the connective tissues of other organs.

A correlation of involvements of endodermal and mesodermal structures throughout the body might show a deficiency of vitamin A (a degree of hypothyroidia) or a deficiency of vitamin C (a degree of hypoadrenia). It remains then to find the vitamin for the ectoderm (possibly B<sub>1</sub> B<sub>2</sub>).

In dentistry a correlation is possible between the apparently contradictory observations. The interrelation between endocrines and sympathetic parasympathetic nervous system, coupled with this new theory, gives an understanding of Price's<sup>11</sup> splendid results obtained by the administration of vitamins A and D. According to charts 1 and 3 Price stimulates the sympathetic and parasympathetic nervous system, producing a tonic influence on the whole system.

Howe's<sup>12</sup> Vitamin C Theory becomes clear if we understand it in the light of the adrenal stimulation of vitamin C (the oxygenizing principle of Sajous<sup>13</sup>) and the action of vitamin C on the mesoderm (Charts 4 and 5). Chart 5 represents the adrenal system as conceived by Sajous.

#### THE PITUITARY BODY

The pituitary body sends nerve fibers upward to the tuber cinereum and the walls of the third ventricle, and hence to the pontobulbar portion of the spinal cord, through the upper four or five rami to enter the sympathetic chain, and then the great splanchnic, which through the intermediary of the semilunar ganglion supplies nerves to the adrenal glands. Through the adrenal glands the pituitary body governs oxidation, metabolism, and nutrition. In all vertebrates the pituitary is also connected with the thyroid.

#### THE THYROID PRODUCT

The thyroid product is an iodized globulin, the globulin being the albu-

<sup>11</sup>Price, W. A.: Eighth Internat. Dent. Congress, Paris, 1931, pp. 30-40.

<sup>12</sup>Howe, Percy: The Effect of Scorbutic Diets upon the Teeth, *Dental Cosmos*, May, 1920. The Effect of Diet upon Teeth and Jaws, J. N. D. A. No. 1, 9:55-60 (January) 1922. Dental Caries, *Dental Cosmos*, August, 1920.

<sup>13</sup>Sajous, C. E. de M.: Internal Secretions and Principles of Medicine, 1 and 2, Philadelphia, F. A. Davis Company, 1922.

VITAMINS	ENDOCRINE GL. CATABOLIC		ENDOCRINE GL. ANABOLIC	VITAMINS
Increases appetite. Promotes digestion. Promotes growth by stimulating metabolic processes. Protects body from nervous disease. Increases quality and quantity of milk during lactation.	Pituitary glycosuria. Increased B.M.R. Decreased CH. tolerance. Glycosuria and hyperglycemia. Intestinal spasticity. Nervousness and mental instability. Temperature normal. Pulse rapid.		Tendency to masculinity in female. Increased virility in male. Acromegaly. Osteoblasts become hyperactive. Torsos longer than extremities. Extra large hands, wrists, bones short and thick. Gonads large and well developed. Temperamental, talkative. Bright mentality. Sex activity increased; pulse, temperature and blood pressure normal. Increased elimination of N and Ph. Retention of Ca and Mg.	
Fresh fruits and vegetables, whole cereals, yeast, wheat germ.	B <sub>1</sub> , B <sub>2</sub>	N	Infantilism (lorraine type) delayed onset of puberty. Defective growth except long bones and dental dysplasia. Amenorrhea or metrorrhagia. Average mentality. Sterility. Impotence. Subnormal temperature. Slow pulse. Teeth are oval small and crowded. Caries.	
Impairment of appetite and digestion. Loss in weight, loss of vigor, constipation, emaciation, subnormal temperature, low blood sugar. Enlargement of glands. Increase in size and weight of thymus, pancreas, testis, ovaries, spleen, heart, liver, kidneys, stomach, thyroid and brain. Results of absence Beri-beri peripheral and other forms of neuritis atrophy of lymphoid tissue.		N	Extreme hypercalcemia. Demineralization of skeleton.	
Promotes tissue formation. Increases blood platelets. Acts on regulating substance. Promotes growth and well being. Promotes appetite and digestion. Prevents infection of eyes, sinuses, air passages and lungs.	O	N	Tetany. Eclampsia. Paralysis. Agitans. Epilepsy. Spasmodophilia. Muscular dystrophies. Rapid decay in children's teeth. Enamel defects on incisors.	
Butter (cream), green leaves and vegetables, egg yolk, liver and organs. Cod liver oil, endoderm.	A	N	Mobilizes cholesterol with possible relation to activated ergosterol? Storehouse of cholin?	
Loss of appetite retardation of growth and development. Physical weakness. Susceptibility to diseases of the eye (myotilopia, xerosis, corneal ulcers), ears (otitis media), kidneys (renal calculi), diseases involving air passages, lungs, skin and bladder. Influences reproduction by failure of ovulation. Anemia. Excessive growth of lymphoid tissue results in results of absence. Xerophthalmia cessation of growth. Pus in ears, sinuses, glands at tongue base.	O	N	Interferes with calcium assimilation. Ulcers? Cancer?	
Tomato, green vegetables, raw citrus fruits. Mesoderm	C	N	Controls CH. metabolism.	
Change in disposition. Capricious appetite. Loss in weight. Physical weakness. Shortness of breath. Rapid respiration. Congestion of internal organs. Tendency to hemoptysis. Increased hemoglobin. Decrease in secretion, increase in weight of adrenals. Decrease in weight of spleen, liver, stomach and intestines. Friability of bones. Necrosis of pulp of teeth. Swelling and redness of gums.		N	Diabetes. Ulcers.	
Meat, fish, egg yolk, cereal, green vegetables, wheat germ.	E	N	Cooperates with thyroid, anterior pituitary, adrenal cortex. Antagonizes thymus.	
Sterility in male. Fetal deaths during period of gestation.		N		

Chart 3

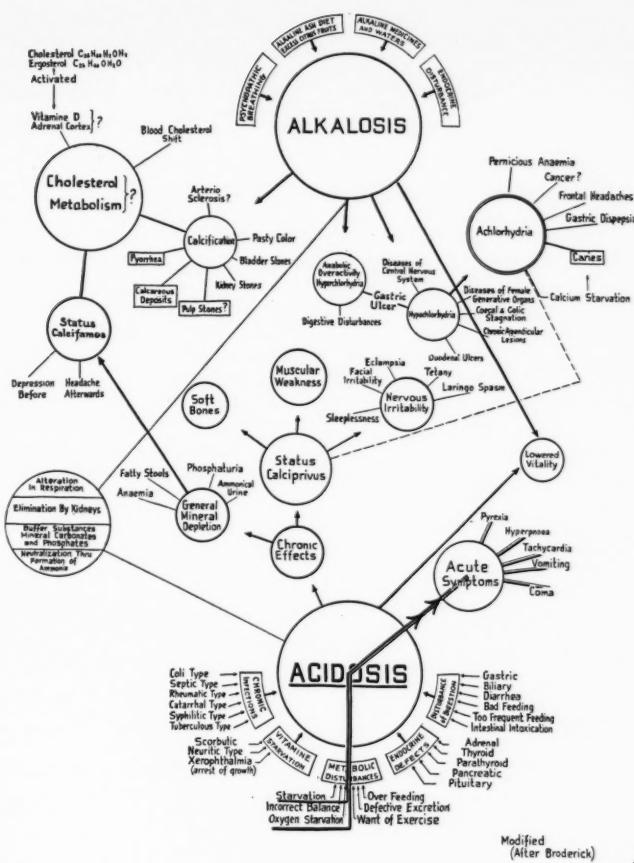


Chart 4

minous constituent of hemoglobin. The thyroid secretion is an oxidizing ferment. The adrenoxidase is carried to the thyroid by the red blood corpuscles. It passes into the lymph spaces and by way of the larger cervical lymphatics and thoracic duct into the subclavian veins, superior vena cava, to the heart. The secretion is stored also in the red blood corpuscles. The iodine in organic combination renders the phosphorus of all tissue cells and particularly their nuclei more prone to undergo oxidation. The iodine increases the germicidal and antitoxic power of the blood by endowing the albuminous portion of the hemoglobin with sensitizing properties; it is as such, the blood constituent which Sir A. E. Wright has termed "opsonin." An increase of thyroid-parathyroid secretion, therefore, raises the opsonic index and promotes phagocytosis.

#### THE ADRENAL GLANDS

The physical manifestations of the human cell colony depend upon oxidation and fermentation. The respiratory process as it has been taught in the past is not accepted by all physi-

ologists. The difference in oxygen-tension in the blood and the alveolar air has been proved at times to be in favor of the blood; but oxygen was taken up because of a substance in the blood which has a great affinity for oxygen and unites with it through the alveolar wall. Sajous called this substance adrenin, the internal secretion of the adrenal gland. It is carried by the venous blood to the heart and hence to the lungs where it becomes oxygenized. The red blood corpuscles bathe in a plasma that is rich in oxygenized adrenal secretion; the corpuscles absorb and store it.

Oxidation of the adrenal principle does not take place in the blood. The adrenal secretion acts as a catalyzer; it transfers oxygen from the pulmonary air to the tissues without being itself modified by the contact. The hemoglobin molecule in the red blood corpuscles becomes oxyhemoglobin, and the red blood corpuscles yield it to the blood plasma in the form of droplets, the so-called blood platelets. The blood platelets are distributed to all parts of the body as an oxidizing agent which sustains oxidation and metabolism.

According to the Catalyzer  $\rightarrow$  Vitamin  $\rightarrow$  Hormone Theory, vitamin C increases oxidation and metabolism if sufficient vitamin A and vitamins B and B<sub>2</sub> are present.

As the sympathetic and parasympathetic nervous system controls the quality and quantity of salivary secretion, and sympathetic stimulation lessens the quantity, producing a mucin-rich,ropy saliva, and inasmuch as sympathetic overstimulation tends to produce a deviation from the normal acid-base balance toward the acid side, the time element coupled to this condition explains the reason for Prinz's observation (a lack of saliva or dry mouth as the cause of caries). Diets with a balanced nutritional value contain the different vitamins and explain again the results obtained. It becomes at once apparent why results are only partly successful, inasmuch as the hereditary endocrine balance of each individual patient is not taken into consideration. The lack of knowledge pertaining to quantitative and qualitative amounts of vitamins and minerals in vegetables grown in different soils will eventually do away with the diet fad and standardized solutions of known vitamin and mineral contents will take its place.

As caries is the result of so many factors, adherents of Miller's theory can only hope to be successful in a certain percentage of cases. Without the bacterial plaque, the cause of its formation being more important, the action of *Lactobacillus acidophilus* is reduced.

These observations would make it appear that the problems of medicine and dentistry are simplified, but it is realized that the solution is far from achieved.

Chart 4 represents a survey of alkalosis and acidosis with their causes and results. In the great circle on the left side of the chart are the methods used by the body mechanism to maintain a normal acid-base balance. The circles below "Alkalosis" give the relationship of progressive symptoms as manifestations of a disturbed acid-base balance in time toward the alkaline side, with a correlation between certain diseases now considered as separate entities.

An overstimulation of the parasympathetic nervous system or of the anabolic group of glands (Chart 1) will increase the hydrochloric acid secretion in the stomach.

This hyperacidity of the stomach should not be confused with acidosis or acidemia. The digestive tract is in reality outside of the cell colony, inasmuch as it runs *through* the body.

As the secretion of hydrochloric

acid into the stomach diminishes the hydrogen ion concentration in the blood, the body is left in an alkaline state. This is manifested physiologically in the alkaline tide which follows the partaking of food. When the pancreas secretes its highly alkaline product, the balance is finally reestablished.

Hyperacidity of the stomach can be produced in two different ways: First, by a parasympathetic overstimulation, increasing the amount of hydrochloric acid; second, by a normal secretion of hydrochloric acid, which becomes accumulated and which cannot become neutralized, on account of the closure of the pyloris through a sympathetic or adrenal shock (fear). This is called pyloric spasm.

While hyperacidity produced by a pyloric spasm is relieved by a base, such as sodium bicarbonate and sedatives, the hyperacidity produced by parasympathetic overstimulation should not be treated in this manner.

An increased intake of protein, or acid-ash food which needs a great amount of hydrochloric acid will in the end eliminate the excessive alkalosis present in the body and reestablish a normal acid-base balance.

With continued overstimulation one becomes aware of digestive disturbances. On account of the continued alkalosis the body is unable to keep on secreting the normal amount of hydrochloric acid, which results in a so-called hypochlorhydria.

It is in this stage that the gastric or duodenal ulcer makes its appearance. In sequence there now follows in time, the so-called "chronic appendix," cecal and colic stagnation, diseases of the female or male generative organs, and finally symptoms appear of diseases of the central nervous system, neurasthenia. This sequence gives, therefore, the underlying cause of neurasthenia; namely, a disturbed acid-base balance toward the alkaline side, in time.

Hyperchlorhydria, caused by anabolic overactivity, followed by hypochlorhydria and achlorhydria with their different manifestations, may well link the appearance of pyorrhea as an early oral symptom of a disturbance of the acid-base balance in an alkaline direction, which again in time makes the appearance of a cancerous lesion possible, as the result of an accumulative disease. This concept adheres to the theory that a cancer grows only in an alkaline soil, in time.

Price<sup>14</sup> called attention to the fact

<sup>14</sup>Price, W. A.: Fundamentals Suggested by Recent Researches for Diagnosis, Prognosis, and Treatment of Dental Focal Infections, *J. A. D. A.* 12:663 (June) 1925.

that patients with a marked tendency to periodontoclasia do not tend to develop proliferative arthritis, but do tend to be susceptible to diabetes, anemia, and cancer.

Pyorrhea alveolaris, which is the manifestation of a local anaphylactic phenomenon influenced by a disturbed acid-base balance in the alkaline direction has as its systemic cause a chronic alkalosis (Broderick<sup>5</sup>).

As shown in Chart 4 when a hypochlorhydria progresses to an achlorhydria through a prolonged alkalosis, the symptoms of a gastric dyspepsia, frontal headaches, pernicious anemia, and the manifestation of cancer become present. Although there are so many theories as to the cause of cancer, this new concept in considering the lesion to grow in an alkaline soil, in time, does not contradict any findings pertaining to the disease. It is only a new approach.

The cancerous growth is acid. It has a positive mitogenetic radiation and its own glycolysis. It is potentially positive.

The blood hydrogen ion concentration is toward the alkaline side of its

normal hydrogen ion concentration. The lack of available carbonic acid prevents dissolving of the calcium carbonate and thereby fails to produce the normal amount of bivalent calcium ions.

Cell permeability is therefore disturbed; mesodermal structures, on account of the decreased catabolic glandular secretion, lose their normal tone, and invasion of the endoderm or epithelial cells becomes possible. The difference of polarity between the acid cancer and alkaline body readily invites invasion of these cells (metastasis).

Pernicious anemia is a common symptom of a continued achlorhydria. Achlorhydria for a long time was also considered a symptom of cancer.

Incidentally, Chart 4 shows where the absence of hydrochloric acid prevents calcium ionization and, therefore, absorption, and produces thereby calcium starvation, which leads to *status calciprivus*. An effort seems to be made to reestablish a normal acid-base balance, but without success (cachexia?).

(Continued on page 201)

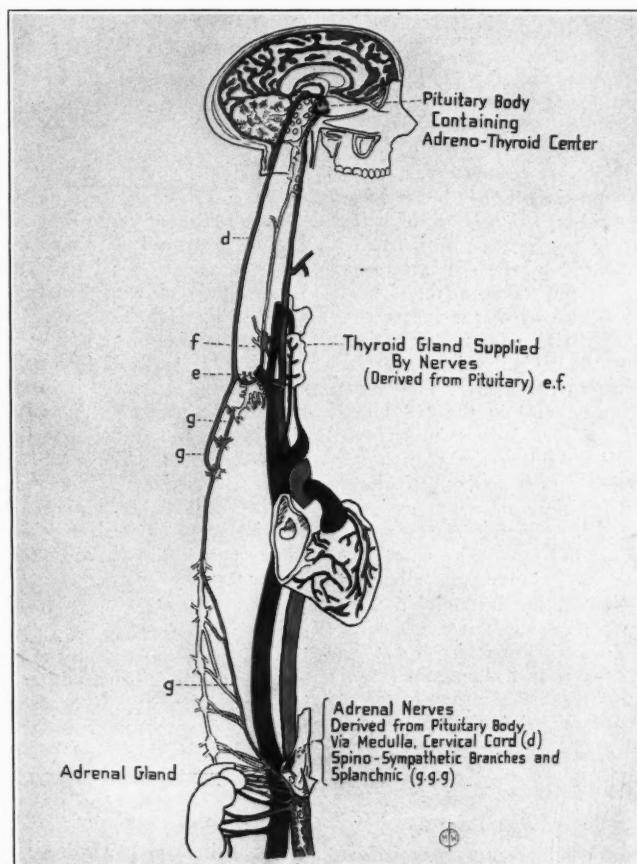


Chart 5—The Innervation of the Adrenal System.

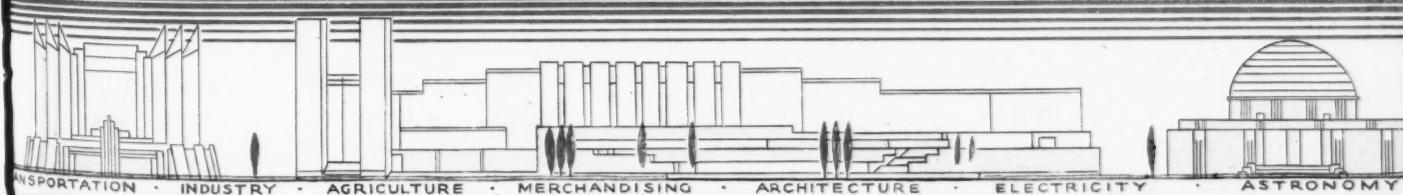
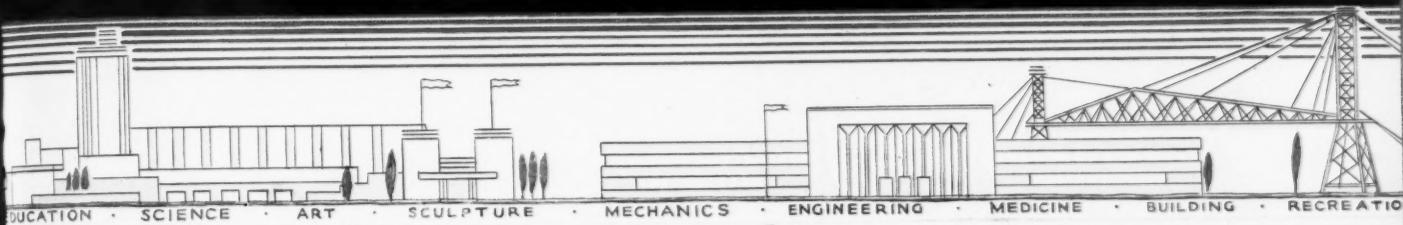
(After Sajous)

R I T T E R

# COUNSELOR

VOLUME 1 No. 3

MAY 1933



CENTURY OF PROGRESS EDITION



## MEET US AT THE WORLD'S FAIR

EVERY dentist who can attend "A Century of Progress" and the August meeting of the Chicago Centennial Dental Congress, should do so without fail.

But, if you can't attend, you will be interested to know that Ritter has seized the opportunity that this great Fair affords to further the interests of your profession.

The Ritter Dental Health exhibit has been designed to impress every man, woman and child who attends the Fair with the importance of preventive dentistry and the vital part that dentistry plays in our lives.

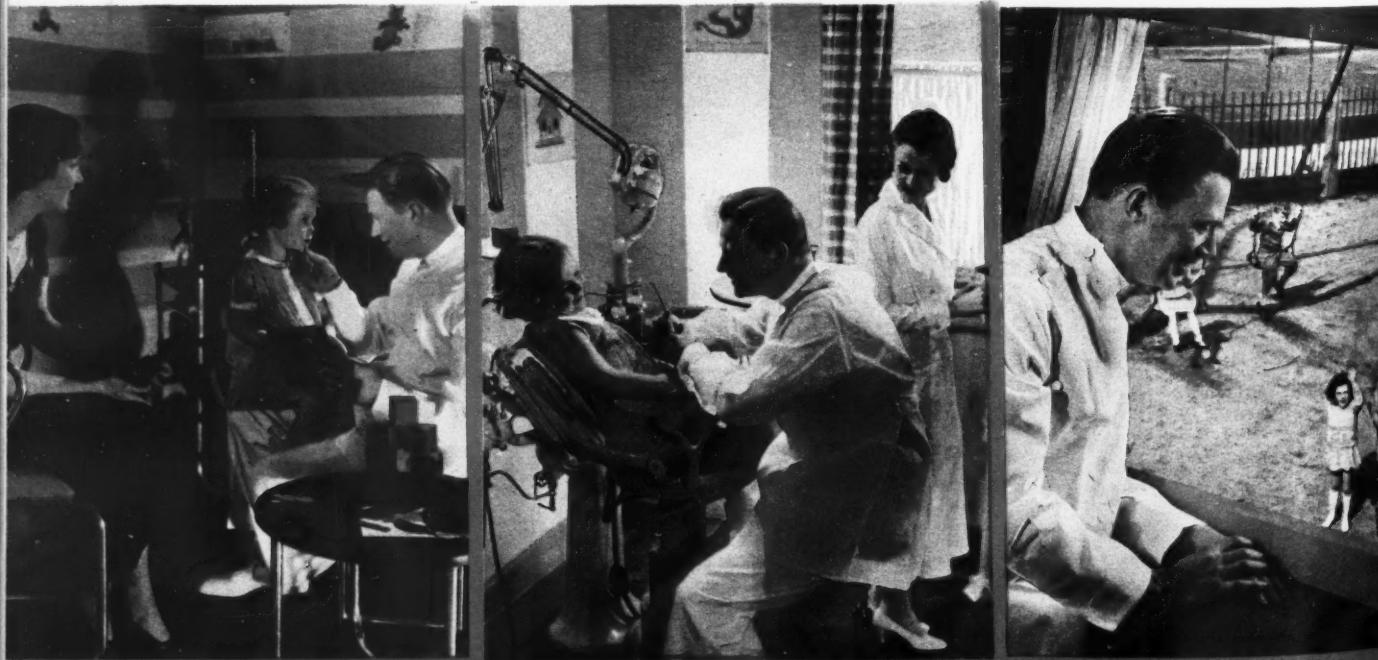
The cover of this issue of the *Ritter Counselor*, shows the large, multi-colored painting that will greet visitors at the entrance of the Ritter exhibit. It portrays the children of various countries of the world, with a large picture of "Oral Happiness, Jr." in the center.

On this page are shown reproductions of large murals in the main lobby of the Ritter exhibit—paintings that portray the dentist as an oral counselor to the family, starting with the pre-natal state of the mother. These murals will also be used as the basis of an attractive booklet which will be distributed at the Fair.

A balopticon, with forty-eight drop slides and sound device will further illustrate and audibly reinforce the general message conveyed by the murals and the booklet.

The Ritter exhibit will also include a junior operatory, a diagnostic room and a master operating room—all equipped with the latest Ritter equipment.

No expense has been spared to make the Ritter exhibit of real interest to every one of your patients or prospective patients who attend the Fair.



# Ritter COUNSELOR

PUBLISHED BI-MONTHLY IN THE INTEREST OF THE DENTAL PROFESSION BY RITTER DENTAL MANUFACTURING CO. INC., ROCHESTER, N.Y.

VOLUME 1

May 1933

NUMBER 3

## What Price GLARE?

*Dr. McKee turns the Spotlight on  
Glare, and Dr. Barton discovers the  
new Ritter "Dualite."*

"BE with you in a second, Tom," said Dr. Barton to Dr. McKee, "just want to wash up a bit—and give my eyes a shot of Collyrium."

"Oh, so it's got you at last, eh?" said Dr. McKee. "No question about it—dentistry raises Cain with a fellow's eyes. They say close to nine out of ten dentists wear glasses. I suppose it's the intense concentration on small areas, and the delicacy of operative work. What a price we pay!"

"I suppose I'll have to get glasses . . . and I dread it!" said Barton. "You know Tom, I think half the trouble is in our lighting methods. We focus strong light into the patient's mouth, and as we work we're constantly turning into that glare. Naturally there is bound to be some eye impairment, eventually."

"Something in that, Bart. Which reminds me. Have you seen that new light of Ritter's? I ordered one."

"Another miracle light, eh? Well, you can squander your money if you want to; I'm fed up on new contraptions."

*The Dualite enables you to refer to your radiographs as you operate.*

"Oh yes? Well then, go blind if you insist. You know as well as I that in this business you're only as good as your eyesight. I'm telling you Ritter has the slickest light you've ever seen. Honestly, Tom, I wish you'd look at it . . . you owe it to your eyes. First of all it gets rid of that glare you're talking about—by the use of an adjustable visor. You can set this visor in whatever position you want, so that you get abundant illumination of the oral cavity without glare in the patient's eyes or your own."

"That doesn't sound so bad," said Barton. "On the spot-light principle, I suppose?"

"Yes, more or less," replied McKee. "But it's not only an unusually fine operating light; the visor is so designed that it also serves as a holder for all types of X-ray mounts and besides its operative illumination, it makes the slickest diagnostic light you ever saw."

"That is an idea," interrupted Barton. "Refer to your radiographs as you operate, eh? That's really a smart one."

"I thought so too," said McKee. "The entire X-ray story is right before you—you hardly need to turn your head. And the light's arranged so that the radiograph support is used in conjunction with the visor; no matter how you use the light, it's glareless."

"How's the illumination?" asked Barton.

"Wonderful—just like daylight. They use two lenses: an azure blue filter to get the desired daylight qualities—and then a special prismatic lens to get a maximum intensity of diffused light over the entire operating area. And it's the most beautifully balanced proposition you ever saw, Bart. Honestly, it almost gets into the right position by request."

"Wow! Another Baron Munchausen," laughed Barton. "But, I'll admit it sounds awfully good. Priced way up in 'G', I suppose!"

"No sir . . . no more than you would pay for an ordinary operating light alone."

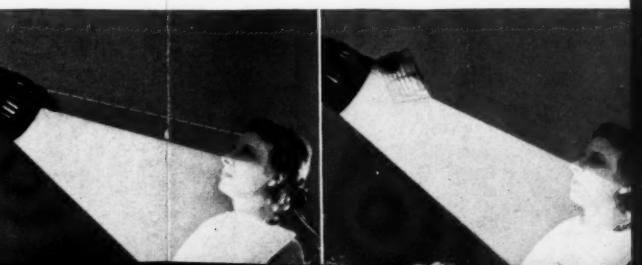
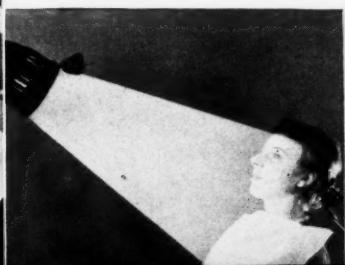
"Boy, you should be a Ritter salesman. But then, you haven't given me too many bad suggestions. Suppose you get busy on that phone, and have Bates send me one when they deliver yours."

"And that's my good deed for today," murmured McKee as he dialed the telephone.

*Dualite with visor up shows ordinary illumination.*

*With visor down, cutting off light below patient's eyes.*

*Radiograph support does not interfere with illumination.*



# Harnessing the X-RA



ROENTGEN 1895...  
Ritter 1933. Both names and both dates represent a culminating triumph in the history of X-ray.

In 1895, while experimenting with cathode rays, Roentgen made the discovery of ray penetration. Carrying his experiments further, he found the ray possessed the power of anatomical penetration. Thus, by harnessing an unknown quantity, science presented the dental and medical world with one of their most powerful agents in diagnosis, prevention and cure of disease.

Neither Roentgen nor any scientist who has followed him in X-ray work, has been able to determine the nature of the X-ray. The most that has been revealed is that it is a product of electrical energy. The known quantities are how to produce it and how to apply it.

Adopted at first, experimentally, by the pioneering progressives of the profession, radiography rapidly established its important position as an aid to complete dental service.

In a brief span of years, it has changed from a dental prerogative to a dental obligation. It takes its place with the local

anaesthesia as a priceless contribution to dental competence and progress.

Among the first practical X-ray units for dental service was the Ritter Model "A" X-Ray produced 13 years ago. *This year, Ritter sets a new milestone in X-ray history, bringing to the dental profession the ultimate scientific expression of X-ray design—the Ritter Model "B" X-Ray Unit.*

Here, in a paragon of mechanical perfection and simplicity, is a compound of all that Ritter's years of building X-Ray equipment has proved to be essential or desirable in X-ray construction and operation.

Here is an X-Ray Unit so fully safeguarded that the dentist can handle any part of it during the exposure time with complete confidence in its safety.

Here is an X-Ray Unit so perfectly balanced that it positions at the touch of the finger—yet once in position, remains so without a tremor.

Here is an X-Ray Unit so rugged and dependable that after 50,000 exposures

of 4 seconds each, made at the rate of two full mouth X-rays an hour, and equivalent to more than 15 years service, there was no perceptible variable in the efficiency of any part of the machine... including the tube.

Here is an X-Ray Unit so efficient that it produces dental radiographs, even of the densest structure with definition and detail that consistently surpass the finest radiographs heretofore obtainable.

Through the use of a straight line focus tube with a longer target anode surface than in the Coolidge tube formerly used, and powered by full 45,000 volts, a greater abundance and concentration of radiation is achieved than ever before possible.

The result is unusual penetration, better density and detail of bone structure—and uniformly accurate records of all bone and tissue conditions. It can now be said with authority that the variable factor in radiography has been reduced to the least common denominator. The new Ritter Model "B" achieves what until now largely has been regarded as impossible in X-ray effectiveness.

In operation, the Ritter Model "B" is simplicity itself. The entire assembly is so finely balanced that the bracket may

*The New Ritter Model "B" Unit applies the cutting edge of nearly four years of research and development to the harnessing of the X-ray.*

sear



# RAY for Dentistry . . .

*Ritter Model "B" X-Ray  
combines cumulative knowl-  
edge of forty years of re-  
search and progress.*

be extended and the operating head correctly positioned before the patient—effortlessly. The head rotates on a vertical axis. The tube moves horizontally. In combination, the two enable quick adjustment to precisely the correct angulation.

*Inasmuch as the tube itself turns with the cone, the target of the tube is always in line with the apex of the cone insuring an X-ray beam of unvarying intensity and penetration.*

Every factor essential to taking uniform form radiographs is predetermined and fixed. The new Ritter X-Ray Unit is designed to enable predetermination and fixing of correct voltage and milliamperage without lighting filament of the tube, thus obviating the need for making test exposures and the consequent danger of subjecting the operator to harmful secondary radiation from rays refracted from metal surfaces in the room. To protect the tube and transformer against fluctuations in line voltage, and to eliminate over-exposure, the unit is equipped with an automatic circuit breaker which operates when voltage exceeds a fixed limit.

Further insurance of uniformly excellent radiographs is provided by the Ritter Time Switch, by which the proper length of each exposure can be predetermined and automatically timed.

In design the new Ritter Model "B" X-Ray Unit discards precedent and ap-

plies radically new and advanced principles.

It literally suspends a complete X-ray machine at the end of a perfectly balanced compensating bracket. Within the compact head—in adjoining chambers, are the high tension transformer and tube . . . completely enclosed and pregnantly insulated.

The absence of wiring, guards, and visible tube, sets the patient at ease. There is nothing about the new Ritter X-Ray Unit to frighten the most timid patient. From the standpoint of the dentist, the Model "B" provides absolute and uncompromising safety. The entire unit is so designed that it could be held in the arms during X-ray exposures without the slightest danger of electrical shock or ray absorption.

The transformer is oil immersed, thus preventing electrical leakage and short circuiting and insuring maximum effectiveness in delivery of energy to the X-ray tube.

But, while the transformer is oil immersed in the New Ritter X-Ray, the tube is not. Owing to the size of the tube, no surface surges or induced current are present, which makes it totally unnecessary to immerse the tube in oil to prevent surface leakage as is the case when small tubes are used. Thus the tube is readily accessible, can be removed at will, can be quickly replaced should such replacement ever be required. The interruption of X-ray routine, therefore, and attending inconvenience of sending the tube and transformer assembly back to the fac-

tory for tube replacement are not imposed on users of the new Ritter Unit. Installing a new tube is a matter of minutes instead of days.

From another standpoint, too, the elimination of the oil immersed tube must be regarded as a major advance in Dental X-Ray *shockproof* design and construction . . .

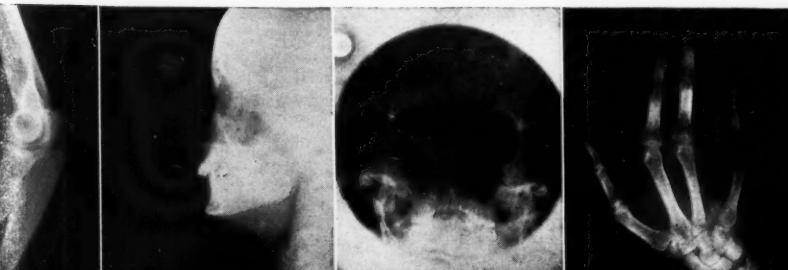
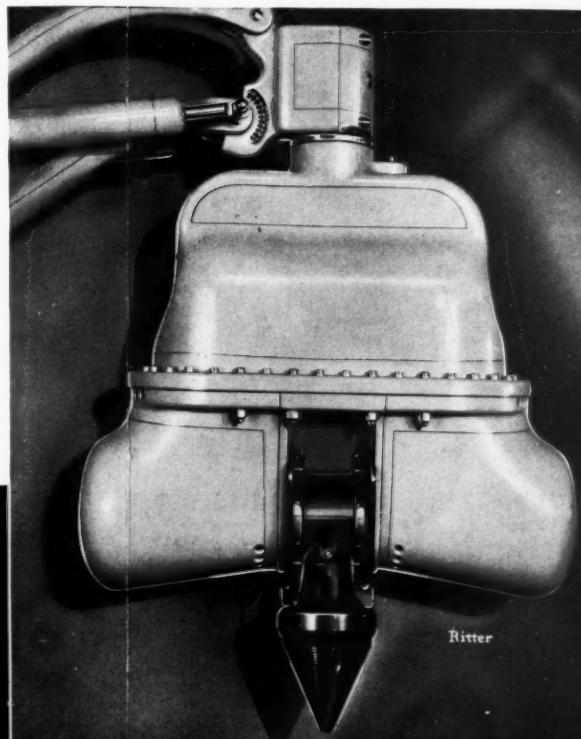
In the tube assembly is repeated the same meticulous attention to safety evident in the design of the transformer chamber. Both the patient and operator are completely protected against secondary rays. The tube is completely enclosed in a bakelite housing to insulate it from the metal case. Radiation of stray rays from the tube is prevented by a lead cylinder surrounding the active hemisphere of radiation, as well as by a lead oxide shield extending from both sides of the lead center to the full length of the tube.

Nor is the extra factor of safety confined solely to the electrical and X-ray elements. The new Ritter X-Ray Unit is also safe *mechanically*. It is ruggedly built—perfectly balanced throughout. The portable model is designed with a mobile brace that makes tipping impossible. In the wall model over 70% of the weight is on the floor, not on the wall mounting.

The bracket assembly is tested to withstand a strain ten times the weight it actually carries. The rotating head is so designed that it cannot accidentally become detached. While breakage of any spring within the bracket tubes is highly improbable, all springs operate by compression instead of extension, which

*(Continued on inside back cover)*

*The head of the Ritter Model "B" X-Ray Unit is practically a complete X-Ray Unit in itself, containing all power units except the auto-transformer and controls which are mounted in the cabinet. The illustration at the right clearly shows the compactness and balanced design of the new Ritter X-Ray head.*



# Keeping IN STEP

# With the Times

"SHALL I buy new equipment now? Can I get along without it? How much should I spend?" Those questions have arisen to perplex more than one dentist during the past few months. And while no inflexible reply can be given that answers all three questions for every dentist—at least a general recommendation can be made.

To question one, the answer is decidedly "yes". If you need equipment, or a near-future need is indicated, and the purchase does not impose too great a tax upon your resources . . . *buy now*. There is no exaggeration in the statement that equipment prices are lower than they have been in years. As material prices rise, equipment prices must also advance. Economists assert there is only one way prices can go, and that is up.

To question two, we can only advise personal analysis of your position, your future objectives, and the adequacy of your present equipment to further those objectives. A dental office lacking any essential unit of equipment is handicapped. Old, obsolete, or out-moded equipment is likewise a deterrent to progress. The patient is quick to mark the difference between the implements of decadence and the tools of progress! "Can I get along without it?" must be

decided according to your square interpretation of your need.

To question three, comes an obvious answer. Buy the best you can with the money you have to spend. You have devoted years of hard work studying the intricacies of a difficult profession. You deserve the best equipment available to aid you in the most effective and profitable application of that experience. Then, too, there is only one guarantee of lasting satisfaction with your purchase, and that is to choose the best.

It is because of an unshakable belief in the validity of "quality", that Ritter has steadily refused to build anything but the finest equipment that can be made. In our estimation any lesser standard would set a stigma of mediocrity not only on Ritter Equipment, but upon the dentists who elected to use it.

The Ritter Company, however, has not been indifferent to the economic tide. Recognizing the possibility of reducing equipment investment through simplification or modification of design, Ritter now announces—

#### THE NEW RITTER MODEL "B" STERILIZER

This new Ritter Sterilizer has been designed expressly to meet the requirements of those dentists who prefer the insured quality and efficiency of the Ritter-built Sterilizer but do not require the size or capacity of the Standard Ritter Model "A" Sterilizer.

The new Ritter Model "B," like the larger model, excels in those features essential to efficient, convenient, positive, automatic sterilization.

It is beautifully designed and staunchly built for life-time service. The cabinet, base and top are made from heavy gauge sheet steel, carefully finished in brilliant black

porcelain enamel, with all metal parts chromium plated.

The Boiler is pressed from heavy seamless sheet copper, with extra heavy reinforcing plate welded to bottom, giving exceptional rigidity and providing perfect thermal conductivity. The cover of the boiler is rigidly constructed with all joints and crevices thoroughly sealed to prevent accumulation of verdigris and to insure a sustained sterile condition.

The electric heating element is exceptionally large in area, covering the entire bottom of the boiler, insuring rapid, uniform heating and sterilization. As in the larger sterilizer, Model "B" Sterilizer is equipped with an automatic thermostat which reduces energy when the water starts boiling—a definite economy in current consumption.

As an extra safety precaution—in case the main switch is not turned off and for full protection to the heating element—an ingeniously designed circuit breaker automatically shuts off the current when the water supply is exhausted. Operation cannot be resumed until control on face of cabinet is reset at closed position.

The drain valve, of bibb seat type, with large opening to give rapid flow, is placed on the front of cabinet where it can be easily reached for dis-assembling and cleaning. Will not drip.

The single, foot-operated cover lifting device is positive in action, and both opens and closes the cover. Cover closes against compression—smoothly, silently.

The shelf and door are all metal construction, heavily enameled. No glass is used anywhere in the Ritter Model "B" Sterilizer—a provision against breakage.

Briefly—here is a Sterilizer that possesses unusual qualifications for your service—a sterilizer that will give day after day—year after year of unfailing satisfaction—at a price that is in complete accord with the trend of the day.

Complete literature is yours for the asking!



# NEW RITTER X-RAY

(Continued from page 3)

makes dropping of the bracket impossible under any circumstances.

Study the new Ritter Model "B" X-Ray Unit, feature by feature; judge it comparatively for efficiency, appearance, ease of operation, compactness, safety—and you build up preponderance of advantages that establish it as the outstanding achievement in dental X-ray equipment of the past decade.

The Ritter Model "B" Dental X-Ray Unit definitely writes a new, advanced chapter in the records of dental radiography.

*Complete descriptive literature will gladly be sent upon request.*

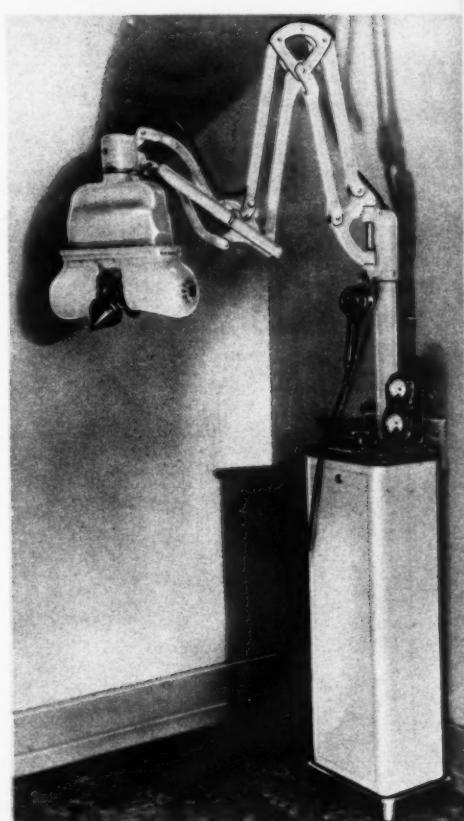
RITTER DENTAL MANUFACTURING  
Co., INC.

Rochester, N. Y.

Ritter Model "B" Dental X-Ray Unit mounted on portable base.

## INCORPORATES STRAIGHT LINE FOCUS TUBE OF NEW DESIGN

This construction gives greater target area and consequently longer life, and produces a smaller focal spot, resulting in radiographs of greater detail. Further new features of this tube are its heavy-glass construction and a more massive anode, increasing the heat storage capacity by 35% and thus adding greatly to the durability of the tube under heavy duty.



Ritter Model "B" Dental X-Ray—wall type, requires only 10x14 inches floor space.



## FINGER TOUCH CONTROL TO ANY POSITION

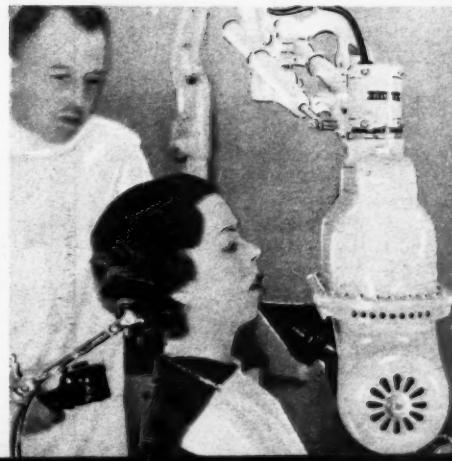
The combination of extension bracket, rotating head, and up and down cone travel, permits positioning for any angle of focus without crowding the patient, or interference with other equipment.

## SAFE

The Ritter Model "B" Dental X-Ray Unit provides absolute and uncompromising safety for both operator and patient. All high tension parts and X-ray tube are enclosed, shielded and insulated. Unit can be handled freely during operative procedure with complete immunity to shock and exposure to secondary rays.



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# Ritter

(Continued from page 192)

The early diagnosis and subsequent local and systemic treatment of pyorrhea, establishment of normal acid-base balance for the patient, may be a factor in preventing the manifestation of cancer in time. The swarming of epithelial cells as manifested in the histopathologic aspect of pyorrhea, as presented by Hulin, differs from the swarming of epithelial cells in malignant lesions only in the maintenance of purpose, the removal of the affected tooth sequestrum.

#### HULIN'S NEW THEORY OF PYORRHEA

Hulin's new theory of pyorrhea considers pyorrhea as:

1. An underlying systemic condition. Colloidal instability of the body fluids related to the "Arthritic State" which is a chronic anaphylactic condition (migraine pains, painful menstrual periods, hepatic disturbances. This is the factor X of Gottlieb, the "unknown" of Broderick.
2. A local necrobiotic effect, produced by colloidal shock.
3. Break in the epithelial lining.
4. Reaction on the alveolar process; irritation of the parasympathetic nerve fibers producing neovascularization; and circulatory overactivity, followed by osteolysis and finally osteitis.
5. Formation of the real pyorrhea pocket due to (a) prolonged contact of foreign proteins (soft tartar and microbial proteins), and (b) contact of organized tartar and localized points of infection, producing a local colloidal shock.
6. Appearance of early suppuration, or at least an inflammatory exudate.
7. Development of static disturbance.

The histopathologic aspect shows: (1) abnormal keratinization, with disappearance of the nuclei in the cells; (2) vacuolization of epithelial cells; (3) intracellular vacuolization; (4) plasmolysis (dissolution of protoplasmic elements); (5) chromatolysis (dissolution of nuclear elements); (6) interstitial edema driving away the epithelial cells; (7) segregated epithelial area; (8) leukocytic infiltration; appearance of polymorphonuclear cells and lymphocytes; (9) infiltration of chorion by white globular masses (transformed epithelial cells); loss of protoplasma; periodontal membrane plus epithelial infiltration plus micro-organism produce granulations; (10) acanthosis (bear-clawlike appearance of epidermal papillae); (11) swarming of epithelial

## A Biologic Concept of Disease—Moschcowitz

#### I. CLASSIFICATION OF DISEASES:

- A. Those which have a well established pathogenesis possess the dignity of a distinct genus or disease.
  - 1. In the absence of a knowledge of etiology, one of the best bases for a classification of chronic disease is a uniform and consistent pathogenesis.
  - 2. Maladies that have the same pathogenesis are usually intimately related.
- B. Those which have been classified on the basis of a mere grouping of clinical phenomena are syndromes.

#### II. DETERMINATION OF DISEASES:

- A. The question of evolution of morbid states is not merely a matter of correct interpretation. It is necessary to note in what phase of the process the symptom or sign occurred before the disease is classified.
- B. Attention is called to the value of the biologic assay in evaluating disease and to the necessity for studying its evolution over more extensive periods than have hitherto been customary.
- C. Unfortunately the number of diseases in which there are positive criteria or tests for diagnosis, such as the finding of the tubercle bacillus, are limited. For the others until either a definite cause or a definite pathogenesis has been discovered, the only way to reach an understanding of the disease is by studying its evolution, both clinically and anatomically.

—Moschcowitz, Eli: A Biologic Concept of Disease, J. A. M. A. 99:714 (August 27) 1932.

cells, infiltrating the alveolar-dental ligament, for the purpose of severing the connective tissue fibers; transformation of epithelial cells into lymphocytes. This swarming shows a definite purpose and though their type may change and sometimes take on a precancerous appearance, they always fulfill their mission; namely, the evacuation of the offending tooth as a sequestrum; and (12) healing of the tissues.

The great "arthritic state" with its calcification falls under the chronic alkalosis condition as does pyorrhea. In fact, in observing many patients with cancer, one finds either a severe pyorrhea or finds that the teeth have been removed because of a pyorrhetic condition.

Colloidal flocculation as manifested in calcification offers possibilities to correlate and solve such manifesta-

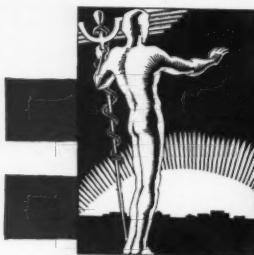
tions as calcareous deposits, which has been proved by Hulin,<sup>15</sup> pulp-stone, kidney and bladder stones, as well as the problem of arteriosclerosis. Colloidal chemistry may solve those problems.

In *status calcifames* is found a guide in practicing preventive dentistry and in relieving women of intense suffering during the menstrual periods.

Cholesterol metabolism seems to be definitely linked with vitamin D.

Kidney function as far as acid phosphate secretion is concerned, coupled with the inhibitory effect on cell permeability by the bivalent calcium-ion is of definite interest in the adjustment of the calcium phosphorus balance in the blood, urine, and saliva.

<sup>15</sup>Footnote 3, *Nature et Mode de Formation des Calculs Salivaires, Tartre Dentaire*, pp. 13-45.



# The DENTAL SCENE

ONE William Brady, M.D., who vends a kind of health information through the public prints, presents from time to time the swivel chair clinicians' ideas of dentistry. Brady is one of a score or more of medical men who conduct health columns in daily newspapers. Fortunately for the public welfare most of these medical columnists present sound, straightforward, fundamental health advice, avoiding, for the most part, the method of the seer and the long distance diagnostician. Their comments on dentistry are usually conservative and accurate.

Columnist Brady, however, is not satisfied to confine his literary efforts to prosaic physical conditions but takes high and long flights into the region of philosophy, education, and reform. His peculiar literary style is an admixture of flat humor and dogma. Recent typical brayings on the dental scene include:

**Titles**—Suggestions that only those who possess the M.D. degree are entitled to the title "doctor"; that those holding the D.D.S. should be addressed "dentist."

**Fees**—This tirade inspired by a charge of five dollars by a dentist for prophylaxis: "Even a dentist's bill is not a picnic, although the dentists have it over the doctors in one respect; namely, they hand the client something tangible—a bit of gold, maybe, or a beautiful denture, or at least a hole he can feel with his tongue—and it is always less painful to pay for a tangible thing."

**Education**—The proposal that dentistry be a specialty of medical practice and that dentistry as an independent profession be done away with. The fact that the Carnegie Foundation's Bulletin on Dental Education (1926) and the report of the Commission on Medical Education (1932) both recommend that dentistry should be continued as a separately organized profession does not daunt Columnist Brady. If he had ever heard of these

reports perhaps he would not modestly dogmatize thus: "So, you see, my proposal is both practical and sensible—it is just a few years ahead of the times."

**Dental Caries**—All the scientific knowledge we have acquired to date in relation to tooth decay indicates that it is a question of nutrition mainly. There is no substantial evidence that any acid in the saliva or any acid product of bacterial fermentation in the mouth is a factor. The theory of some acid dissolving calcium or phosphorus or something out of the tooth structure is the bunk, Professor McCollum of vitamin fame to the c. n.

Our monograph "How to Have Sound Teeth" costs a dime.

Which prompts us to ask, "Brother, can you spare a dime?"—for this kind of information.

**Hygeia**—Another, but excellent kind of public health information is found in the magazine *Hygeia*, a publication of the American Medical Association. In this magazine dental subjects are presented by dentists. Recently, two excellent articles on dental subjects for the layman were published. One, a detective story in the Holmes-Watson manner ("A Case of Mistaken Identity," February, 1933), was written by Doctor Lon W. Morrey of the Chicago Board of Health. This story of the Molar Brothers and their sad end is worth reading. It is entertaining; the suspense is good, and the educational value excellent.

Doctor Morrey is known to the readers of *THE DENTAL DIGEST* as the author of the dental health playlet, "Grandfather Molar," which was published in the July, 1932, number.

The April issue of *Hygeia* carries an accurate article on pyorrhea by Doctor Robert H. Brotman.

It would be well for dentists to support this worth while magazine and encourage the public to turn to it for sound and authentic information on health subjects. In its pages will be found no spectacular therapy nor curbstone diagnoses.

While we are discussing public education on dental subjects we may examine with interest the project recently undertaken by the Committee on Dental Economics of the Chicago Dental Society. To summarize from the *Bulletin* of the Chicago Dental Society of March 23, 1933:

1. A series of twelve copyrighted educational articles suitable for the laity will be prepared.

2. One article will be published each month in the *Bulletin* of the Chicago Dental Society.

3. Reprints will be made available to any member of the Chicago Dental Society who may desire to subscribe to the Educational Reprint Service.

4. The Educational Committee will try to have these reprints reach subscribers' offices shortly before the first of each calendar month.

5. In order to explain this service to patients and give it authoritative backing the Educational Committee has drafted an explanatory letter and will supply this free on society letterheads to each subscriber in sufficient quantities to accompany his first mailing.

6. The subscriber is expected to mail these reprints exactly as received, only to bona fide patients of record, without unethical enclosures.

7. The copyright on all the material in connection with this Educational Reprint Service will be vested in the Chicago Dental Society and written permission for its use by others than subscribers must be obtained from the Chicago Dental Society.

## ERRATUM

On page 73 of the February number (A Scientifically Correct Inlay Technique by David W. Phillips, D.D.S.), there appears the equation: INVESTMENT EXPANSION (SETTING AND THERMAL) = GOLD SHRINKAGE CONSTANT + WAX.

The subhead SHRINKAGE VARIABLE which follows should have been part of the equation which reads in its correct form:

INVESTMENT EXPANSION (SETTING AND THERMAL) = GOLD SHRINKAGE CONSTANT + WAX SHRINKAGE VARIABLE.

## PREPARATION OF ARTISTIC RECORD AND DEMONSTRATING MODELS

LAURA M. HARVEY, Dental Assistant

Detroit

THE preparation of record models for unusual cases is a laboratory process that many dentists have been putting off because of lack of time. This also applies to demonstration models for use in presenting dentistry. Glass shelves lined with unsightly plaster models are not an uncommon sight in dental offices.

Many dentists today keep records of patients' mouths before extractions to assure patients of their interest and to add to the probability of their returning for dentures. An impression of the anteriors alone often suffices for this type of work. In the case of the orthodontist a record model is made before the treatments begin and another after completion. Sample bridges made to fit on permanent models for illustration may be kept, and is another phase of this work. A model with a glazed surface has been found to be much easier to work with when making a porcelain jacket crown. With this type of model, the possibility of chipping the plaster is eliminated. The condition of pyorrhea is more simply illustrated when the patient can be shown a model of his own mouth with the gums tinted to show the stage of the infection.

When so many instances necessitate the use of plaster models, the models should be made to look natural. Usually, the dentist brings out a segment of a jawbone that is startlingly real in its resemblance to a portion chopped from a skull. The patient is expected to subordinate his natural revulsion to the bony structure as he listens to the dentist's statement that it represents his own condition and to a semi-technical explanation of a proposal to remedy his ills.

For an expenditure of little more than a dollar, a number of models may be made to present an entirely different aspect. Naturally tinted gums with properly shaded smooth-surfaced teeth can replace the white porous models now made.

After the impression is taken in compound or any other impression material, and the plaster or stone has been poured, the assistant can add

greatly to the appearance of the impression by making a base. After this has been done, it is a simple process to make the solution and dip the models: One and a half teaspoons of pink Tintex dye and an equal quantity of the orange color may be added to half a glass of water. This solution is painted on the plaster model with a cotton roll, a light sweeping stroke being used to prevent a blotchy surface. The places around the teeth can be painted with a small camel's hair brush. This solution will be absorbed by the plaster, and will give a more natural effect than a paint or any coating that might tend to interfere with the detail. A thin mixture of equal parts of yellow and brown water colors will give a porcelain tinge to the otherwise white teeth. After these colors have been allowed to dry the model is ready for dipping.

To prepare the solution for dipping, a pound of white stearic acid may be melted in a small deep basin. This acid may be purchased at a low cost at a wholesale drug company. When melting this acid one should be careful not to overheat it as there is a tendency to cause the model to turn yellow from overheating the acid. If orthodontic models are being dipped, this is particularly important, because the models should be kept as white as possible. The model is submerged into the hot solution, and a bubbling reaction will be noticed. The model is left in the solution approximately from three to five minutes, or until it ceases bubbling. It is best not to leave the fire burning under the solution at the time the model is in the basin, because the heat in such close contact might crack the model.

If stone is to be dipped, it might be best to warm the model before dipping it to prevent breakage. The acid will penetrate so thoroughly into the plaster, about a fourth of an inch, that it will not interfere with the detail of the model. This has been proved by using the models for making porcelain jacket crowns. After the model is taken out of the acid, it should be allowed to dry on a piece of absorbent paper for about half an hour. It will

be noticed that the model has a hard, smooth, transparent coating, which will take a good polish and leave a glazed surface. The base may be lacquered black to prevent the model from showing fingerprints. In case the model becomes soiled after this process, it may be washed with soap and water without injury.

The stearic acid may also be made into a cold solution by dissolving it in chloroform, benzol, or alcohol. The model may be dipped into this solution as in the hot solution, but the coating will be thinner and much more apt to come off. The hot solution allows the acid to penetrate deep into the surface.

In using these solutions I have experimented with aniline dyes, alcohol soluble dyes, and other water color dyes, which have a tendency to run or change color when dipped into the solutions. Water colors may be used, however, if more orange is added to the mixture for tinting gums to allow for the change in color when dipped.

With the method described here clean models of a natural appearance may be had which can be preserved for years to come.

765 David Whitney Building.

### LETTERS

I congratulate you on your wonderful new work in the dental journal field.—C. P. JANICKI, D.D.S., Chicago

Have not received the February issue, and do not wish to miss a single copy, as it is one of the most progressive dental magazines published in my estimation.—D. L. POWELL, D.D.S., Siloam Springs, Arkansas

I think DENTAL DIGEST is the best dental magazine I ever read and just chuck full of good sound knowledge.—J. R. CHARLES, D.D.S., Johnstown, New York

Permit me to express my appreciation to you for your very fine publication. THE DENTAL DIGEST is unquestionably a post-graduate course in itself. More power to you.—JAMES H. GROSECLOSE, JR., D.D.S., Dallas

## *The Editor's Page*

SUBSTANTIAL evidence indicates that many dentists are using the enforced idleness of the present to improve their technique and expand their training. Dentists who in the late 1920's seldom attended dental society meetings because of the stress of a full professional or social schedule are showing a greater interest in local dental society programs. For instance, in 1929-1930 the average attendance at the monthly meetings of the Chicago Dental Society was about 500. During the present period, 1932-1933, the average attendance has been about 800, an increase of 60 per cent. In fact, at the April meeting of this society more than one thousand dentists heard Doctor Wilton W. Cogswell's paper on "Dental Oral Surgery" and attended the twenty-seven table clinics afterward. This would suggest three things: one, that dentists are taking a keener interest in this work; two, that they are particularly interested in the practical problems of practice; three, that the general practitioner is again returning to general practice and is performing many of the operations himself which in busier days he referred to specialists.

Another bit of evidence to strengthen this contention developed in the response that Doctor David W. Phillips received from an article published in this journal (A Scientifically Correct Inlay Technique, February, 1933). This article, which was long, technical, and scientific, but with wide practical application, inspired more than a hundred letters from interested readers to the author. This reader response, plus a 40 per cent increase in paid subscriptions to this magazine in the last year, indicates that dentists are giving close attention to the contemporary technical literature. This increase in reader interest is undoubtedly true for all journals in the dental field.

Although one hesitates to become sentimental over the economic crisis and pour out blather about its being "a blessing in disguise" and such idle prattle, it is fair enough to interpret the future of the profession in terms of this reawakening of interest in dentistry by dentists.

It is safe to say that with the improvement in technique and training of the individual members of the profession the general level of dental practice will be raised and with this elevation will come an increasing respect and interest on the part of the public. Then, from this improvement in public good will we may recruit the sentiment that may be needed to counteract any suggested radical changes in practice that would be detrimental to our interests.

In short, a well trained body of dentists, organized for self-improvement and economic self-protection, each man versatile enough to care for all the ordinary and common dental diseases and conditions, equipped to render services at fair fees is the best defense against obnoxious practices.

The portrait of a dentist in professional decadence might show the man who belonged to no professional organization, but to every social club in town; who never attended a dental society meeting, but never missed a card game; who never "cracked a book" or tore the wrappers from his journals, but who read every stock-broker's prospectus; who never invested an inlay or soldered a bridge, but regularly and religiously oiled his fishing tackle, cleaned spark plugs, and tinkered with his radio—in brief, a dentist who practiced dentistry routinely, unprogressively, and as a method for making money to place in speculation; a businessman dentist and not a professional dentist.

Today, the evidence suggests that many dentists are returning to the complete practice of dentistry, both from economic necessity and as an avenue of psychologic escape from the business stress and strain of the moment. True, there are fewer patients presenting themselves these days but those who are are probably receiving higher quality service. And in the long or short intervals between patients dentists are preparing themselves to render a superior type of service for future patients. The dentist "au courant" is one of the gifts of the depression.

# WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?

## III. FIELD STUDIES IN MODERNIZED ST. MORITZ AND HERISAU, SWITZERLAND

WESTON A. PRICE, D.D.S., M.S., F.A.C.D.

Cleveland, Ohio

LIFE, as viewed in the light of modern social trends, is a paradox if we do not find that with the accumulation of the conveniences, comforts and luxuries for which mankind in general strives, there is an increasing degree of perfection in bodily development, both in man's efficiency and in his continued functioning. If, we reasoned, we could find communities with all the physical advantages of altitude, climate, and locally produced natural foods similar to those of Loetschental, Grachen, Visperterminen, and Ayer, which were reported in the last two installments of this article,<sup>1</sup> and if, in addition to these advantages, the people of these communities were able to avail themselves of the helpfulness of modern medical and dental science (hospitalization, prenatal care, child welfare clinics, and public health instructions including oral hygiene)—then, we should find a high state of dental efficiency and freedom from caries approximating physical perfection and superb physical efficiency. To find such a place one would naturally think of places that are world-famed as health resorts providing all of the best of modern conveniences that science and industry can assemble. Surely such a place should be St. Moritz which is situated in the southeastern part of the Republic of Switzerland near the headwaters of the Danube in the upper Engadin. This world-famous watering place attracts people of all continents for both summer and winter health building and for the enjoyment of the mountain lakes, snow-capped peaks, forested mountain sides, and crystal clear atmosphere with abundance of sunshine.

The journey from the Canton of Wallis (Valais) to the upper Engadin takes one up the Rhone valley continually climbing to get above cascades and beautiful waterfalls until

one comes to the great Rhone glacier which blocks the end of the valley. The water gushes from beneath the mountain of ice to become the parent stream of the Rhone river which passes westward through the Rhone valley receiving tributaries from snow-fed streams from both north and south watersheds as it rolls westward to the beautiful Lake Geneva and then onward west and south to the Mediterranean.

It is of interest and significance that a study of the childlife in this valley as made by Swiss officials and reported by Doctor Adolf Roos and his associate showed that practically every child had tooth decay and the majority of the children had decay in an aggravated form. People of this valley are provided with adequate railroad transportation for bringing them the luxuries of the world.

If one proceeds from the end of the Rhone valley he might go north by the Grimsel pass over a high range or southeast over the Furka pass through snow banks (even in summer) and on eastward toward the Engadin country. As we travel westward through the Rhone valley we are paralleling to the north the Loetschental valley which we have previously studied. I have referred to the great glacier system extending westward from the snow fields of the Jungfrau to Loetschental, the approach to which by way of the Loetschental is so difficult that few ever undertake the journey. There is, however, an easy approach to this mountain system from Interlaken which is reached by going northward from the Rhone valley over the Grimsel pass. The portal of this monarch is through the Lauterbrunnen valley which is one of the grandest gems of mountain scenery in all Switzerland. I have shown this scene in Fig. 2 of this issue in which

will be seen the varied splendor of one of the glimpses from our train as it passes before an ever-changing panorama of waterfalls, glaciers, multi-hued granite peaks and a vast expanse of carpet-laid valley. The train plays

hide and seek with the eagles, even diving beneath glaciers and coming to the surface on occasion to permit of superb vistas and finally, through one of the master feats of engineering, reaching the continental divide at Jungfraujoch, 11,340 feet above sea level. One reason for tracing the course to this view is to give a conception of the enormous expanse of the snow and ice fields that slope away in various directions. One gets the notion that he would like to take his food and clothing in a toboggan and go coasting on and on westward to the end of the snow field as it makes the eastern retaining wall for the Loetschental valley. It would be a perilous journey except in most favorable weather and with skillful guides since this is the home of the summer blizzards. These are the snows that nourish the streams for watering the many plains where man has built his industries for supplying the markets of the world. The snow fields are the store houses of the energy which man will harvest. Will it always be used for his physical betterment?

Presently the people in the lower plains will be considered, but first a group that has been reared in the companionship of the higher valleys should be studied. We go on eastward to the headwaters of the Danube for which these eternal snows furnish the sinews of a mighty river. As we pass eastward through Andermatt we are reminded that the trains of the St. Gotthard tunnel go thundering through the mountain a mile below our feet en route to Italy.

To reach our goal, the beautiful modern city and summer resort of St. Moritz, we enter the Engadin country famed for its beauty and crystal clear atmosphere. In Fig. 2 is shown a view from the car window in which is seen the lavish blending of the greens and blues, and indeed as the train climbs the winding ascent we are reminded of the vision which must have been the inspiration for Straus as he translated the picture to

<sup>1</sup>Price, W. A.: Why Dental Caries with Modern Civilizations? I. Studies in Primitive Loetschental Valley, Switzerland. II. Field Studies in Primitive Valais Districts, Switzerland, THE DENTAL DIGEST 30:94 and 30:147 (March and April) 1933.

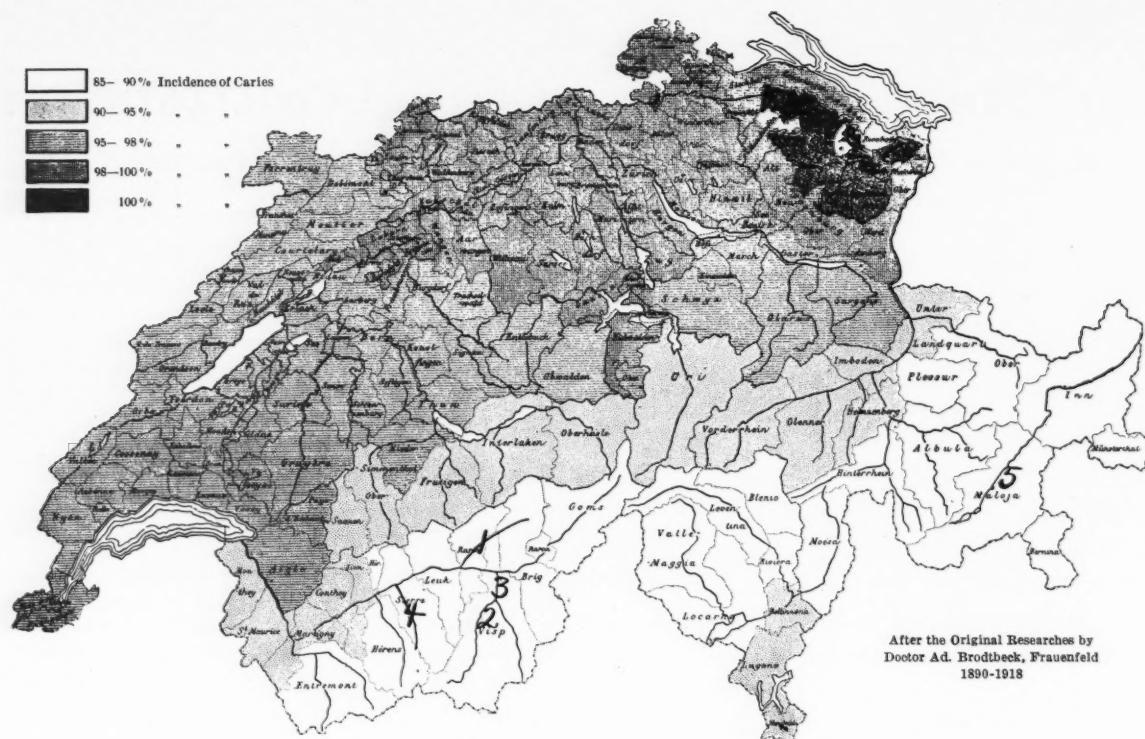


Fig. 1.—The extent of tooth decay in Swiss school children. This outline map of Switzerland shows the distribution and severity of dental caries and the location of some of the districts studied by the author: (1), Loetschental; (2), Grachen; (3), Visperterminen; (4), Ayer; (5), St. Moritz, and (6), Herisau.

the music of his Blue Danube Waltz.\* One is constantly impressed with the blueness of the Alpine skies, forming a background for the purple of the far-away snow-capped mountains and with the blending of the blue and the purple with the warm greens of the wooded foreground. We already know something of the beauty that awaits us which has attracted pleasure seekers and beauty lovers of the world to St. Moritz, the setting of which is shown in Fig. 3. One would scarcely expect to see so modern a city as St. Moritz at an altitude of a little over a mile, with little else to attract people than its climate in winter and summer, the magnificent scenery, and clear atmosphere. We have passed from the communities where almost everyone wears homespuns to one with white collars, silk hats, and English walking coats and the most elegant of feminine attire. The children are refined and everyone shows the effect of contact with culture. The hotels in their appointments and design are reminders of Atlantic City. Immediately one sees that something is different here than in the primitive localities: The children here do not

have the splendidly developed features, and the people here do not give evidence of the great physical reserve that was seen in the communities already reported.

Through the kindness of Doctor William Barry, a local dentist, and the Superintendent of the Public Schools, we were invited to use one of the school buildings for our studies of the children. The summer classes were dismissed with instructions that the children be retained in the rooms or kept conveniently near so that we could have them for study as rapidly as we wished. Several factors were immediately apparent. The teeth were shining and clean, giving eloquent testimony of the thoroughness of the instructions in the use of the modern dentifrices for efficient oral prophylaxis. The gums looked better and the teeth more beautiful for having the débris and deposits removed. Surely this superb climate, this magnificent setting combined with the best of modern prophylactic science should provide a 100 per cent immunity to tooth decay. But in a study of the children from 8 to 15 years of age, 29.8 per cent of the teeth out of every hundred examined had already been attacked by dental caries. Here again our studies included careful examina-

tion of the mouth; photographs of the faces and teeth; the obtaining of samples of saliva for chemical analysis; also mouth cultures, and a detailed study of the nutrition used in each case. The diet was strikingly modern and the only children found who did not have tooth decay proved to be children who were eating the natural food of whole rye bread and plenty of milk.

A detailed discussion of the chemical differences in the food constituents will be made of both the districts conducive to immunity and those conducive to susceptibility in the fifth article of this series to appear in the July, 1933, number of *THE DENTAL DIGEST*.

I was told by a former resident of this upper Engadin country that in one of the isolated valleys only a few decades ago the children were still carrying their luncheons to school in the form of roasted rye carried dry in their pockets, just as their ancestors had eaten their cereal for centuries preceding. There is no question but that along with good physical exercise from the process of mastication not only all of the minerals would be had but also all the factors of the embryo

\*The Danube is no longer blue in the cities where the river serves for drainage, and consequently is a disappointment to travelers who see it only in cities, such as Budapest.

grain except those which may have been injured in the roasting.

St. Moritz is a typical alpine community with a similar physical setting to those in the Cantons of Bern and Wallis (Valais). It is, however, provided with modern nutrition consisting of an abundance of white flour products, marmalades, jams, canned vegetables, confections, and fruits—all of which are transported to the district; only a limited supply of vegetables is grown locally. We studied some children here whose parents retained their primitive methods of food selection and without exception those who were immune to dental caries were eating a distinctly different food from those with high susceptibility to dental caries.

Few countries of the world have been so untiring in their efforts to study and tabulate the incidence of dental caries for various geographic localities as have the authorities in Switzerland. Through the kindness of Doctor Adolf Brodbeck I am privileged to present a map of Switzerland (Fig. 1), to be discussed later, which discloses by its shadings the incidence of dental caries for the various communities. The shaded areas indicate the incidence of dental caries according to the percentage of persons affected. It is important to observe this critically. In the most deeply shaded area, lying to the north and east near Lake Constance, there is a considerable district where 100 per cent of the people are reported to be suffering from dental caries. In the next lighter shading the incidence of dental caries is from 98 to 100 per cent thus lacking little in severity of 100 per cent. This district covers an extended agricultural and commercial area where the greater part of the population is to be found. Practically all of the balance of Switzerland supporting considerable population comes within this and the next shading which shows from 95 to 98 per cent of persons suffering from dental caries. Of the two remaining shadings one has from 90 to 95 per cent and the other from 85 to 90 per cent individual susceptibility to dental caries. The last group is located within the rugged alpine country and incidentally includes the general district in which the few relatively limited primitive groups were found in the Cantons of Bern and Wallis (Valais) previously reported. Since the district in the vicinity of Lake Constance has so high an incidence of dental caries that it is recorded as 100 per cent, it seemed especially important and desirable to make a similar critical study there and to obtain samples of saliva

and detailed information regarding the food and to make detailed physical examinations of growing childlife in this community. Accordingly, through the great kindness of Doctor Hans Eggenberger, Director of Public Health for this general district, we were given exceptionally fine opportunity for studying the children and obtaining the specimens of food and saliva and for securing clinical data and records.

Arrangements had been made by Doctor Eggenberger so that typical groups of children, some in institutions, could be carefully studied. He is located at Herisau in the Canton of St. Gall. We found work splendidly organized for building up the health of these children insofar as outdoor treatment, fresh air, and sunshine were concerned. Dental caries being a major problem and probably nutritional, it was being treated by sunshine. The boys group and girls group were both being given suitable athletic sports under skillfully trained athletic directors. These groups are located in different parts of the city. Their recreation grounds were open lawns adjoining wooded knolls which gave the children splendid protection and isolation to play in their sunsuits and build vigorous appetites and thus prepare them for their institutional foods which were largely a modern menu. Critical dental examinations were made and an analysis of the data obtained revealed that twenty-five out of every hundred teeth of these growing boys and girls had already been attacked by dental caries and that only 4 per cent of these children had escaped from the ravages of tooth decay which many of them had in an aggravated form.

As bad as these conditions were we were advised that what we had seen was better than the average for the community. The ravages of dental caries had been strikingly in evidence as we came in contact with the local and traveling public. As we studied these children we occasionally found one with much better teeth than the general average just as we had at St. Moritz. Of course, we were eager to know why these children had a different dental condition than the others. We usually do not need to inquire long before we find the answer. For example, in one of the St. Moritz groups in a class of sixteen boys there were 158 cavities or an average of 9.8 per cent present or past cavities per person (fillings are counted as cavities). In three other children in the same group there were only three cavities

past or present and one without dental caries. Two of these three had been eating dark bread or entire grain bread and one was eating dark bread and oatmeal porridge. All three drank milk liberally.

When looking here for the source of dairy products one is immediately impressed with the absence of cows on pasture in all the plains in Switzerland in which areas a large percentage of the entire population resides. True, one frequently sees large laiteries or creameries but the cows are not in sight. When I asked a government official the explanation for this he stated that it had been found that a larger quantity of milk could be obtained from the cows if they were kept in the stables during the period of high production. Indeed this was a necessity in most of those communities since there were so few fences, and during the time of the growth of the crops, including the stock feed for the winter's use, it was necessary that the cows be kept shut up. About the only time that cows were allowed out on pasture was in the fall after the crops had been harvested and while the stubbles were being plowed.

In studying the diets of the children in St. Moritz and Herisau in every case those with the lower number of cavities per person were using milk more or less liberally. Of the total number of children examined in both places only 11 per cent were using milk in their diets, whereas 100 per cent of the children in the other districts that provided immunity were using milk. Nearly every child in St. Moritz was eating white bread. In Herisau all but one of the children examined were eating white bread in whole or in principal part.

Since there are so many cattle being stall-fed in the thickly populated part of Switzerland and since so low a proportion of the children seem to be using milk even sparingly, I was concerned to know the use that was being made of the milk. I was interested to find, as was suggested by the numerous signs, which might sometimes be mistaken for the names of the towns or the stations, announcing the brand of sweetened milk chocolate made in that district. This is one of the important products for export and constitutes as a beverage a considerable item in the nutrition of large numbers living in this and in other countries. It is recognized as a high source of energy primarily because of the sugar and chocolate which when combined with the milk greatly reduces

the ratio of the minerals to the energy factors as expressed in calories.

It was formerly thought that the dental caries which was so rampant in the greater portion of Switzerland was due in part to low iodine content in the feed and food because of this deficiency in the soil. Large numbers of the former generations suffered from clinical goiter and various forms of thyroid disturbances. That this is not the cause seems clearly demonstrated by the fact that dental caries is apparently as rampant today as ever before, if not more so. The iodine problem has been splendidly met by the medical service of the community through a reinforcement of the diet of growing children and others in stress periods with iodine in suitable form. Indeed the early work done in Cleveland by Crile, Marine, and Kimball was referred to by the medical authorities there as being the forerunner of the control of the thyroid disorder in these communities.

It was of interest to be advised that many in former generations in that general district of Switzerland had had abnormally small teeth, which was thought to be associated with iodine deficiency, and that one of the principal manufacturers of artificial teeth had made a special mold for adaptation to the needs of the people of that district. The present generation, however, does not have abnormally small teeth.

The officials of this community were so deeply concerned regarding the rampant dental caries that they were carrying forward institutional and community programs with the hope of checking this affliction. If dental caries was primarily the result of an inadequate amount of vitamin D, then sunning the patients should provide for an adequate reinforcement. This is one of the principal purposes of getting the growing boys and girls of the community into sun suits for tanning their bodies, as illustrated in Fig. 4.

Another procedure to which my attention was called consisted of adding to the bread a product high in lime which was being obtained in the foot hills of the district. This and other types of bread were studied by chemical analyses and will be discussed in a later communication.

It is of interest that I have established a clinic in a neighboring town for the purpose of demonstrating with a group of children that dental caries can be controlled by a simple nutritional program. An important incident has developed in connection with the selection of the children in this experimental group. When parents were asked to permit their children to have one meal a day reinforced, which I have demonstrated to be adequate by my two clinical groups in Cleveland, the objection was made that there was no use trying to save the teeth particularly for the girls since they should have all their teeth extracted and artificial teeth provided before they were married because they would lose them then. One of the purposes of this clinic is to ascertain whether it may be feasible completely to control the dental caries almost entirely with products that are available within that country.

If reference is made to the map of Switzerland in Fig. 1 the location of the different districts which have been included in these studies will be seen. They have been made in three major drainage areas. Number 1 indicates the location of the Loetschental valley; 2, Grachen; 3, Visperterminen; 4, Ayer—all in the Rhone drainage basin. Number 5 indicates the location of St. Moritz in the upper Engadin on the headwaters of the Danube; 6, Herisau in the drainage basin of the Rhine. It is of interest that the southern part of Switzerland including the high alpine country is largely granite. The hills in the northern part of Switzerland are largely limestone in origin. A great number of the people live in the plain between these two geologic formations which is largely alluvial having been washed down from both formations. It is extraordinarily fertile soil and has supported a thrifty and healthy population in the past.

When I asked a government official what the principal diseases of the community were he said the most serious and most universal was dental caries, and the next most important, tuberculosis, and that both were largely modern diseases in their country.

When I visited the famous advocate of heliotherapy, Doctor Rollier,

in his clinic in Leysin, Switzerland, I wondered at the remarkable results he was obtaining with heliotherapy in nonpulmonary tuberculosis. I asked him how many patients he had under his general supervision and he said about 3,500. I then asked him how many of them come from the isolated high alpine valleys and he said not one; they are practically all from the Swiss plains but some from other countries.

I inquired of several clinicians in Switzerland what their observations were with regard to the association of dental caries and tuberculosis among the people of Switzerland. I noted that the reports indicated that they were generally associated. We will find an interesting correlative of this in my studies in the Outer Hebrides.

These studies in Switzerland, as so briefly presented here, seem to demonstrate that the isolated groups dependent on locally produced natural foods have nearly complete natural immunity to dental caries and that the substitution of modern diets for these primitive natural foods destroys this immunity whether in ideally located elevated districts like St. Moritz or in the beautiful and fertile plains of lower Switzerland. The question seems to answer itself in a general way, without much laboratory data, from a critical examination of the foods. The laboratory analyses, however, identify the particular factors in the foods which are primarily responsible by their presence in establishing immunity and by their absence in inducing susceptibility to dental caries. These studies have pertained to communities dependent on rye and dairy products in large part for their primitive nutrition. In later studies diets that do not contain either of these fundamental primitive foods will be considered.

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Fig. 2—This magnificent gateway to the Jungfrau range shows the typical verdure and shelter of the high Alpine valleys.



Fig. 3—The famous summer and winter health resort of St. Moritz.



Fig. 4—Sun tanning is a health service in Herisau. This is a typical boys' camp.



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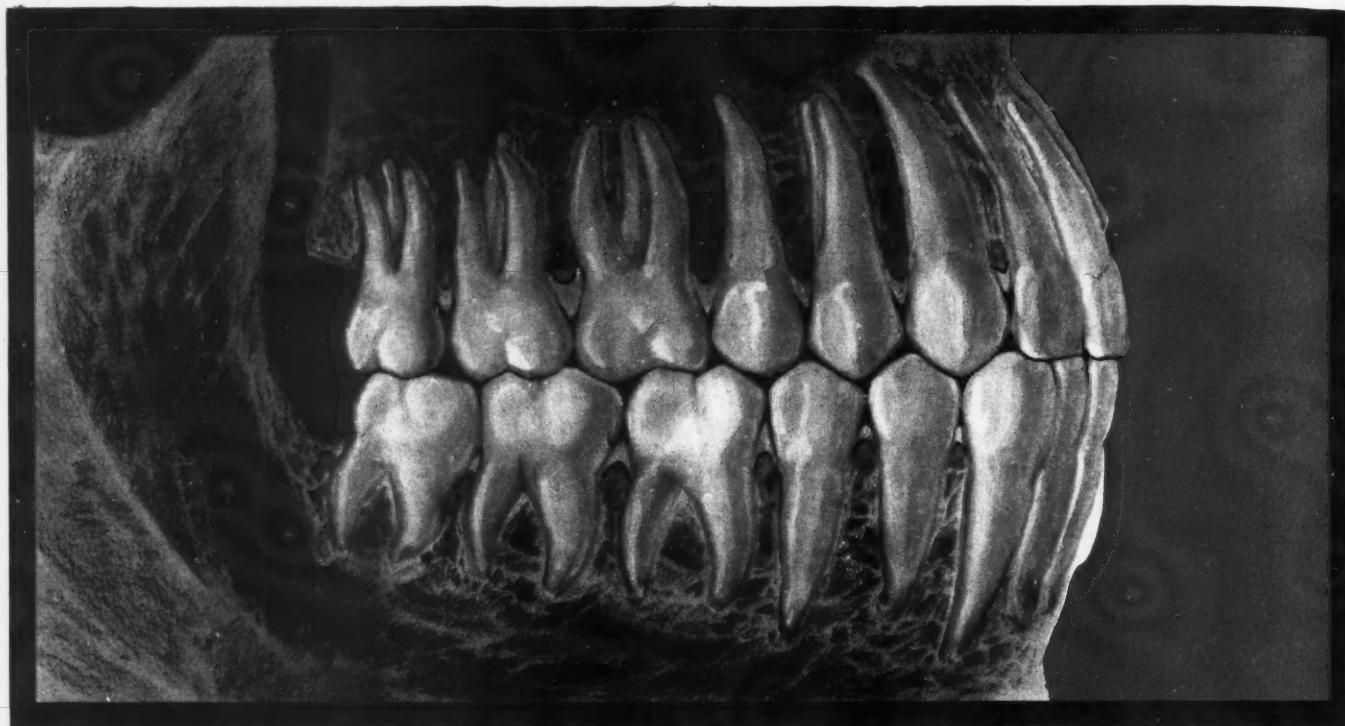
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# THE EDUCATION OF THE DENTAL PATIENT\*

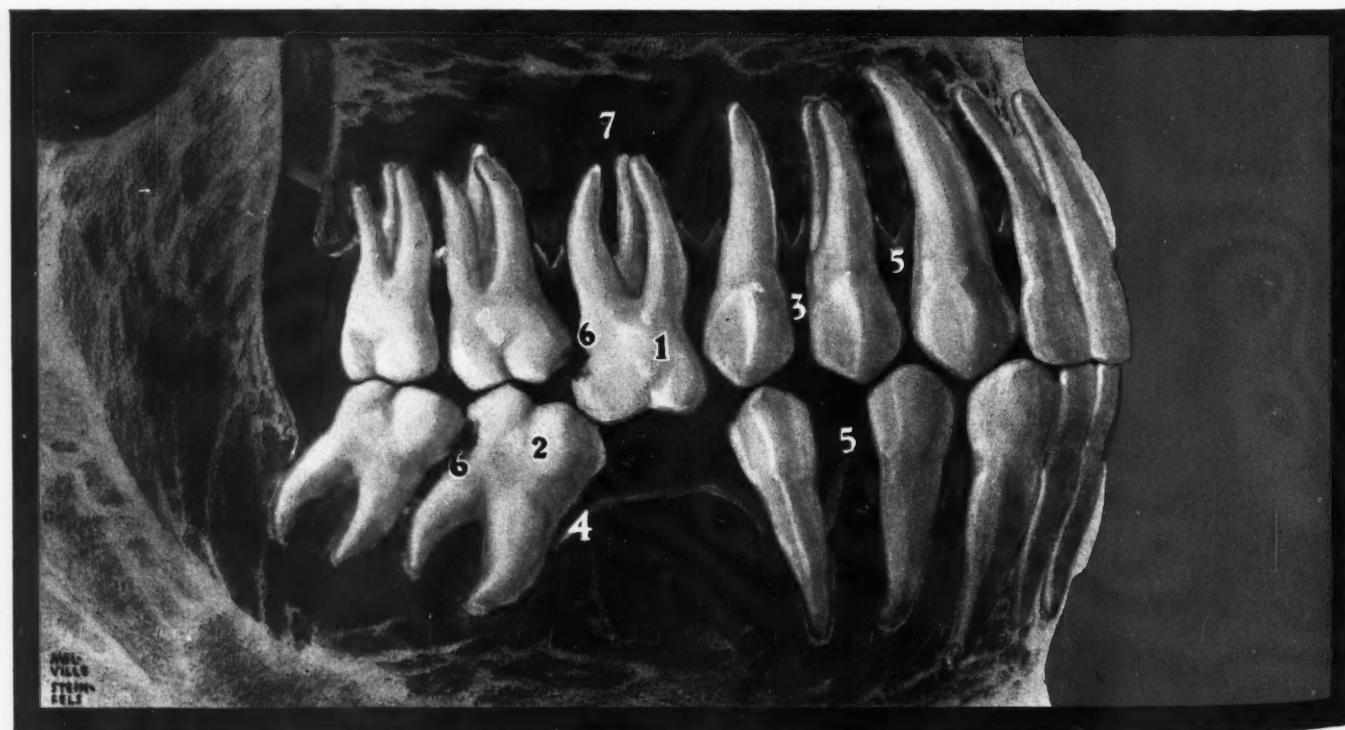
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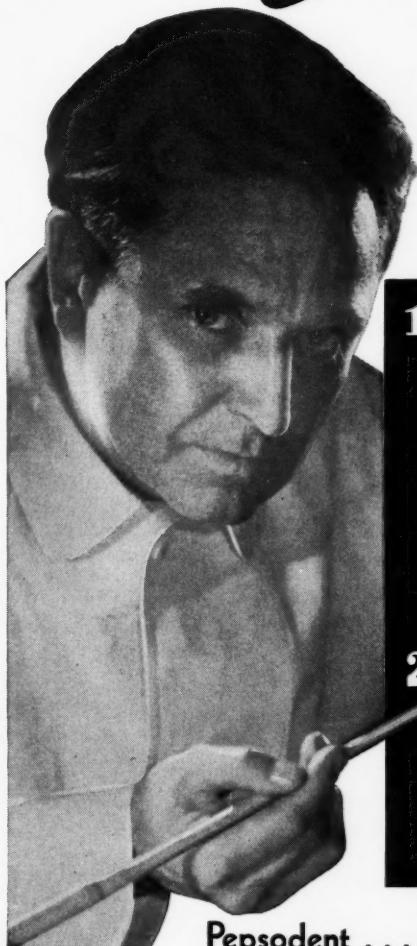


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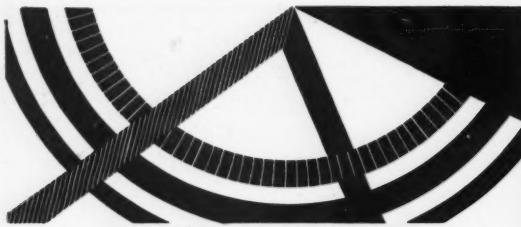
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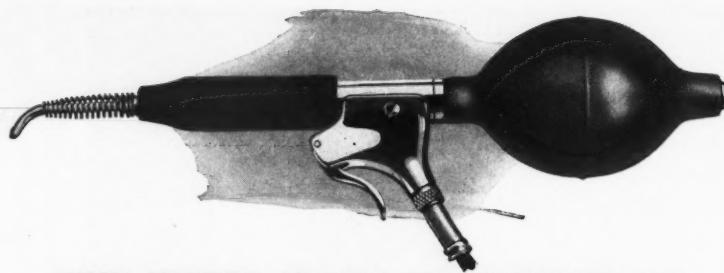
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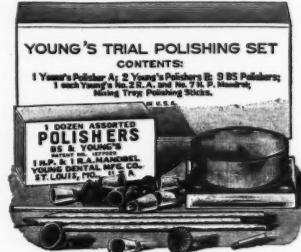
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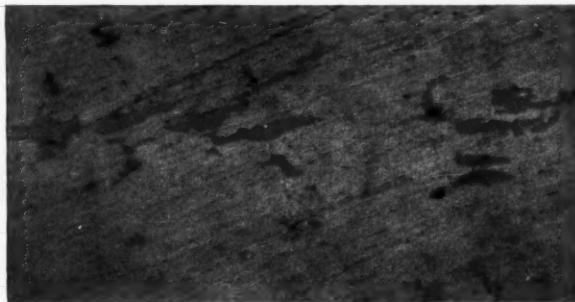
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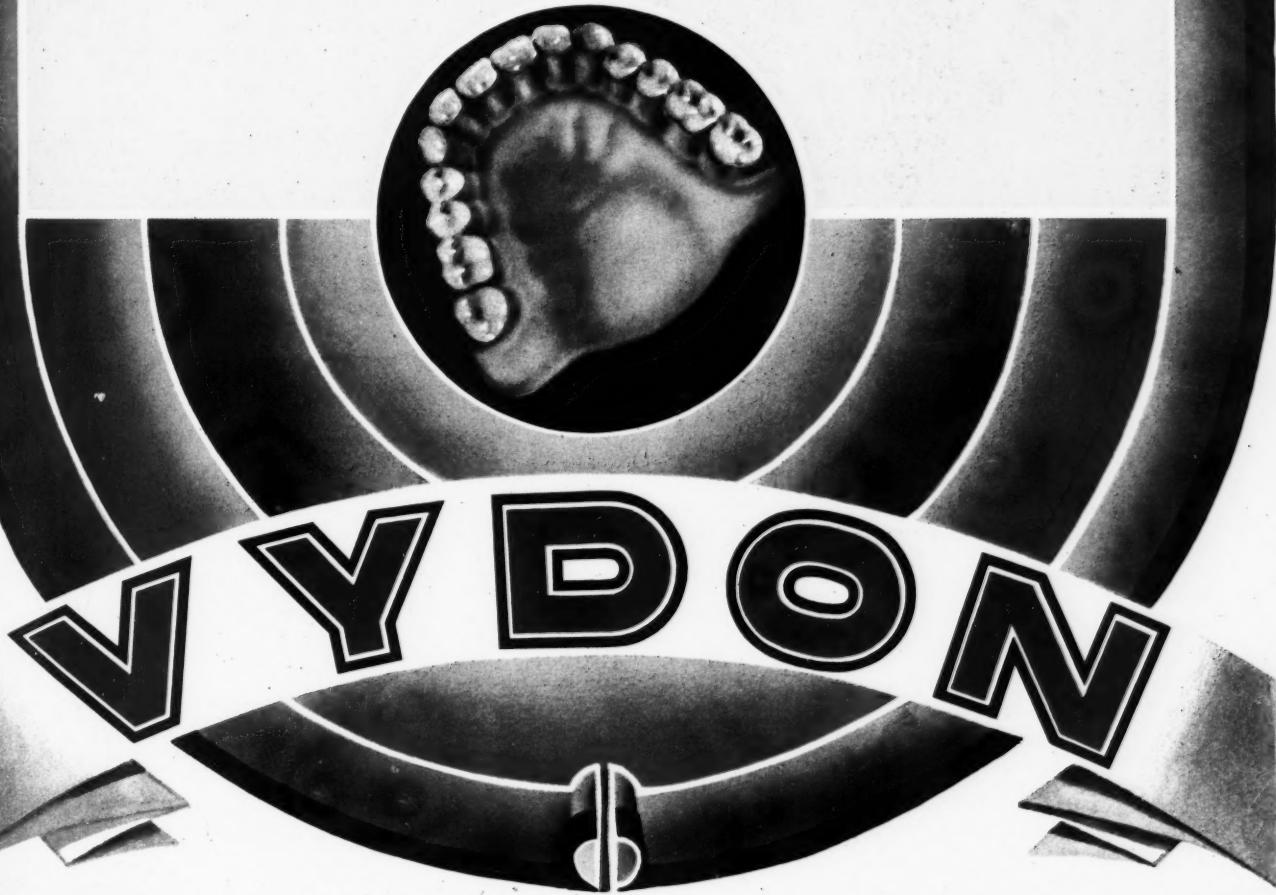
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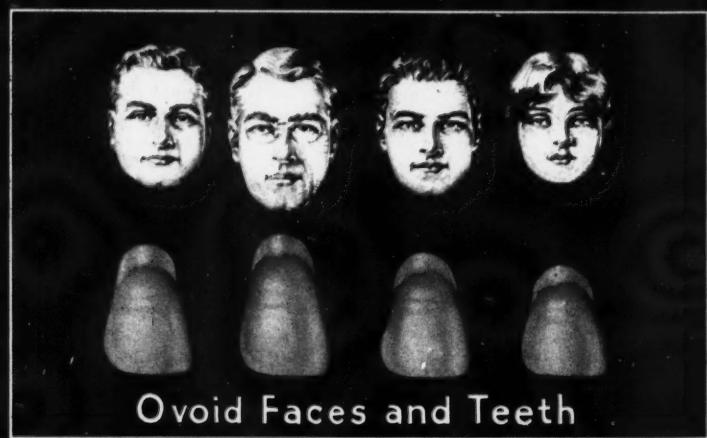
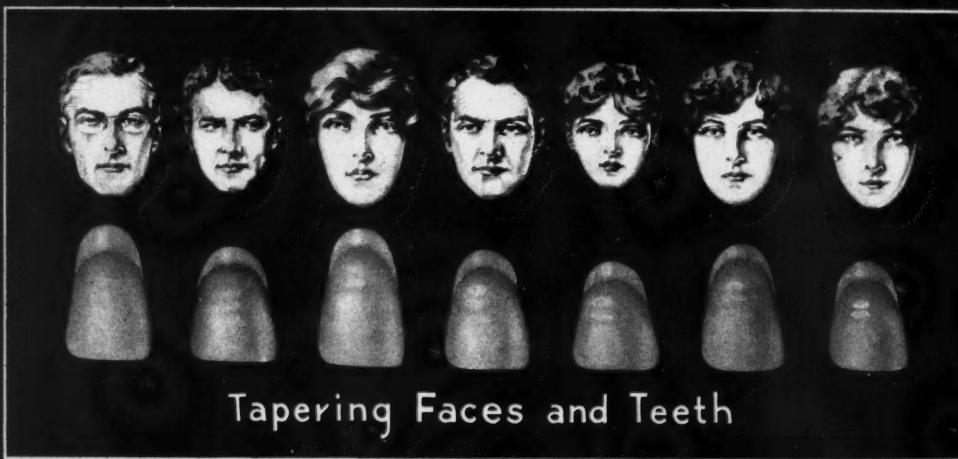
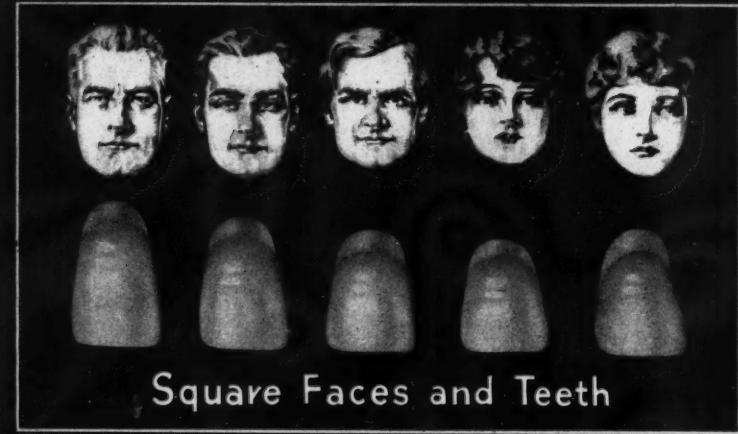
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